AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING

Civilian and Defense

JUNE 1, 1951

In This Issue . . .

Special Equipment at Cleveland Tank Plant

More Turnpikes to Handle Modern Traffic

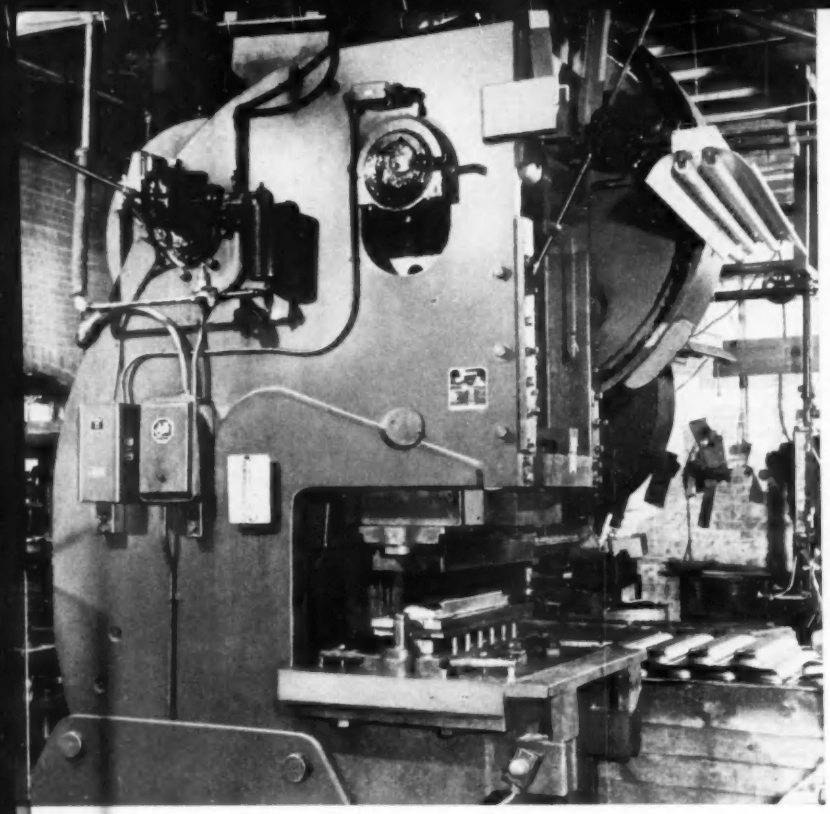
Controlled Atmosphere for Engine Assembly

General Motors 1951 High Compression Engine

Fire Truck Requirements of the Air Force

Complete Table of Contents, Page 3

A CHILTON PUBLICATION



What's YOUR problem?

Wesley L. Tharp, with headquarters in Indianapolis, is the Standard Oil lubrication specialist who recommended STANOSTAMP Compound "C" to this midwest lamp manufacturing company.

Specially trained and experienced Standard Oil lubrication specialists are located in strategic spots throughout the Midwest. There's one near your plant, ready to give you the benefit of his experience.

You can obtain his prompt, on-the-spot service by phoning or writing to your local Standard Oil office. And when the specialist calls on you, ask him about these other fine Standard Oil products.

STANICUT Cutting Oils. These special-duty cutting oils meet today's most exacting requirements and highest production schedules. Grades vary in viscosity and compounding. Each contains the correct proportion of extreme-pressure and friction-reducing ingredients.

STANICOOL HD Soluble Oil. Because of additional compounding, this heavy-duty soluble oil possesses the cooling ability of an emulsion and also gives better tool life and finer finishes than do conventional soluble oils.

STANOLEX Oils. Due to superior wetting ability, these oils are useful on bearings which are inclined to rust during shutdown, or because of high humidity. They are recommended for lubrication of ways and guides on machine tools which are prone to chatter when straight mineral oils are used.

Beats trouble to the draw...

Drawing lamp shades from 20 gauge, cold-rolled steel proved troublesome for the General Lamps Manufacturing Corporation of Elwood, Indiana. Rejections averaged 15%. In addition to this costly scrapping, finish was not satisfactory. It was difficult to remove the die lubricant from the completed shades. Dies had to be polished frequently.

Operators sought a die lubricant which could remedy their production slow-up. Of a number of products tried, STANOSTAMP Compound "C"—the recommendation of a Standard Oil lubrication specialist—gave the best results.

Use of STANOSTAMP "C" has cut rejections from 15% to less than ½%. Excellent finish has been obtained on the shades. Cleaning of dies has taken minimum time and labor. As a result, STANOSTAMP has helped boost production by more than 15%.

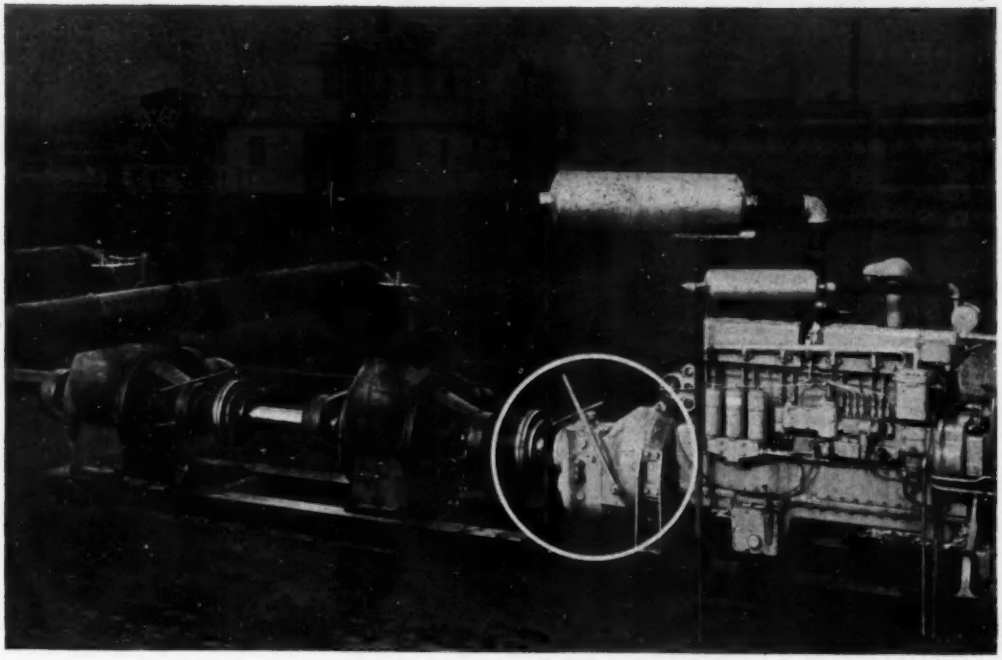
Stanostamp
REG. U.S. PAT. OFF.
Compounds

Discuss the advantages of STANOSTAMP Compounds and Standard Oil cutting oils with a Standard Oil lubrication specialist. His headquarters are near your plant. How you can benefit from his services is explained at the right.

Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA) STANDARD

Cotta Reduction Unit modifies engine speed on emergency pipe line . . .



When the Brandon Road Lock on the Illinois Waterway was under repair last winter, engineers found it necessary to set up an emergency 3200 foot pipeline to transfer oil from barges below the lock to waiting shuttle barges.

Power for the pipeline was supplied by two diesel engines, each driving two oil pumps. To reduce the engine speed to conform with the pump requirements, each diesel was equipped with a Cotta Reduction Gear Master Clutch Unit. Whenever you have a problem of modifying higher speeds of modern engines to handle lower operating speeds of equipment — on cranes, drillers, locomotives, shovels, generators, pumps, etc. — come to Cotta!

THIS INFORMATION WILL HELP YOU

Diagrams, capacity tables, dimensions and complete specifications sent free on request. Just state your problem — COTTA engineers will help you select the right unit for best performance. May we work with you?

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

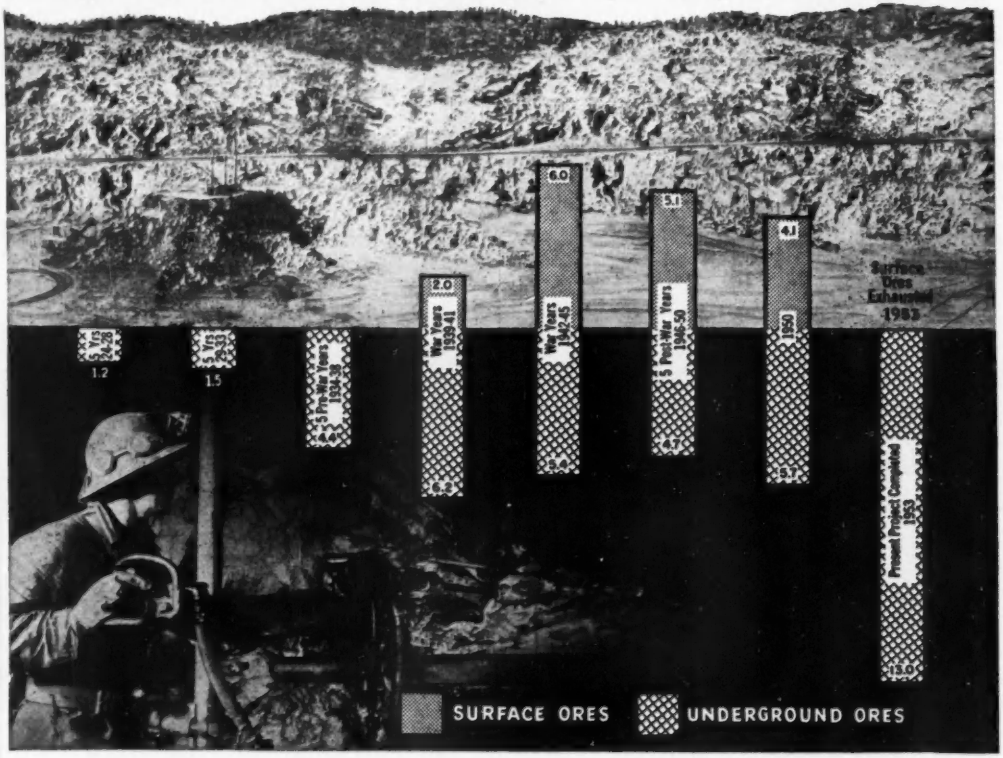
An Assurance of Dependable Service

COTTA

HEAVY-DUTY REDUCTION UNITS

"Engineered-to-order"

Underground and surface ORE MINED (yearly average—millions of tons)



Underground for Defense

...started more than 10 years ago

STRENGTH...military and economic ...depends on productivity. And productivity depends on men who have devoted long years to their specialized chosen field of endeavour.

Such men with "know-how" mine nickel from the rocky rim of Ontario's Sudbury Basin ...

By increasing output with maximum speed and drawing on reserve stocks of nickel previously accumulated, they helped raise deliveries of nickel in all forms during 1950 to 256,000,000 pounds ... a record for any peace-time year.

This record, 22% greater than the 209,292,257 pounds delivered in 1949, was no accident ...

In 1937, INCO launched a vast long-range project which now makes it possible to meet the military requirements of the United States, Canada and the United Kingdom. In addition, nickel deliveries are being made to government stockpiles and the balance of the supply is being rationed among civilian consumers in all markets throughout the free world.

Since the inception of International Nickel, its fixed policy has always been to increase the supply of nickel. To meet today's needs, INCO went underground years ago.

Anticipating the eventual depletion of Frood-Stobie open pit surface ores, more than 10 years ago, INCO embarked on a program of replacing open pit with underground capacity. This required extensive enlargement of underground plants, development of new methods of mining not previously undertaken and the revamping of metallurgical processes to cope with difficulties in recovering nickel from the new types and lower grades of ores which have to be reached.

Major expansion in output of nickel from underground operations is being driven to conclusion with utmost speed. There is still much construction to be done and a number of mining and metallurgical problems remain to be solved and tested in actual operation. Barring unforeseen interruptions, full conversion to underground mining should be completed in 1953.

When the present undertaking is completed, INCO will be able to hoist 13,000,000 tons annually, and the size of its underground mining operation will surpass that of any other non-ferrous base metal mining operation in the world.

This underground expansion is being completed by INCO without interrupting current production of nickel, which is at maximum capacity.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

AUTOMOTIVE INDUSTRIES

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Contents

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AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

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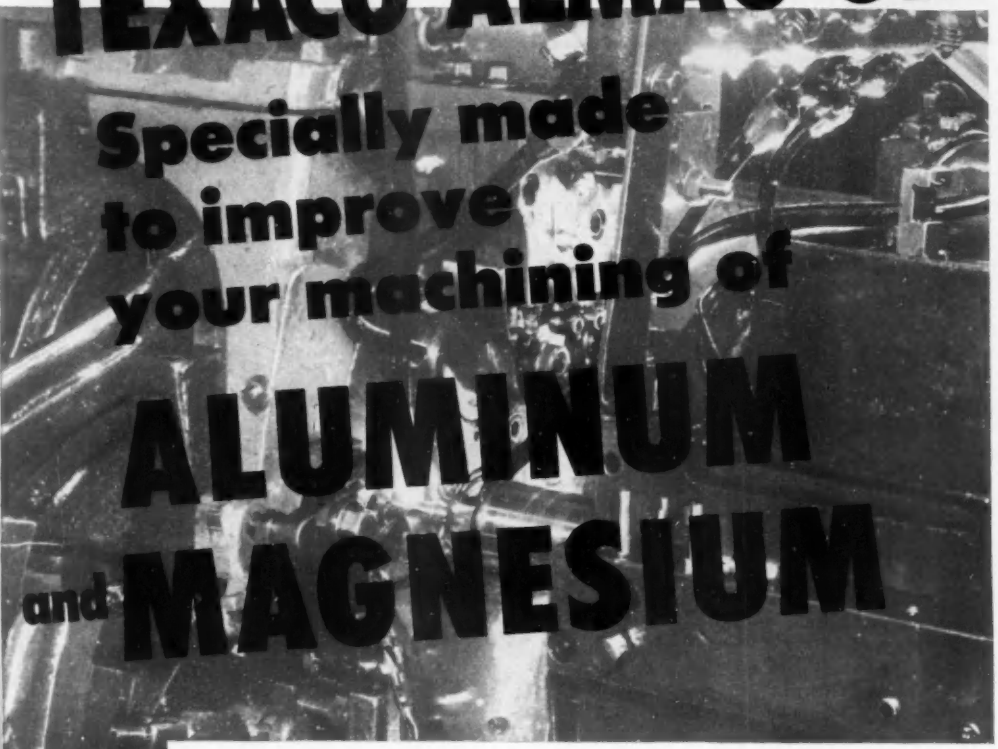
TEXACO ALMAG OIL

Specially made to improve your machining of ALUMINUM and MAGNESIUM



You can step up production, get better finish and bring down the cost of machining *al*uminum, *mag*nesium and their alloys by using *Texaco Almag Oil*. Users report these benefits with all types of machining—tapping, reaming, turning, boring, grinding, milling and the rest.

Texaco Almag Oil is exactly right for working aluminum and magnesium. It's heavy enough to keep chips from piling up on the rake, light enough not to cause metal distortion. You can hold size on any job. And you'll get a better finish.

You'll get longer tool life, too, because *Texaco Almag Oil* quickly settles out abrasive dirt and chips. And its high flash and fire points are a vital safety factor. In addition, *Texaco Almag Oil* doesn't smoke, has no odor, and is nonirritating. You can count on it for an extra-long service life.

Let a Texaco Lubrication Engineer specializing in machining operations help you do all your aluminum and magnesium work better, faster, and at lower cost. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 E. 42nd St., New York 17, N. Y.

TEXACO

TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

Powered to "give it" built to "take it"

Exide DIESEL STARTING BATTERIES

Start your Diesel engines with Exide . . . the battery that's built specifically for the job. It's a product of long development and endless testing to give you top-cranking performance under the most severe operating conditions. With Exide Batteries you get:

Quick breakaway and *high cranking speeds.*

RUGGED CONSTRUCTION for hard service.

EXTRA LONG LIFE—low depreciation, less frequent replacements.

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Use Exide Diesel Starting Batteries for all heavy-duty service. Equip your trucks, buses, tractors or aircraft—gas or Diesel-powered—with economical, long-lasting Exide Batteries.

THE ELECTRIC STORAGE BATTERY COMPANY
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Exide Batteries of Canada, Limited, Toronto
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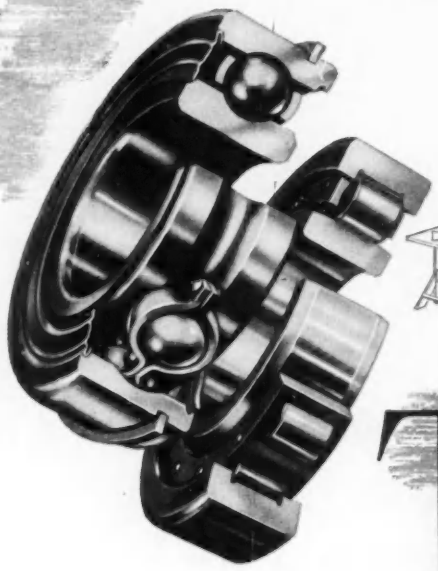
WHEN IT'S AN Exide
YOUR DIESELS START

1888 . . . DEPENDABLE BATTERIES FOR 63 YEARS . . . 1951

AUTOMOTIVE ENGINEER

SKF BEARING ENGINEER



TEAM

FOR EFFICIENCY AND ECONOMY

Over the years, SKF engineers have worked closely with engineers and designers in every field of industry. This co-operation, this *team-work*, has helped industry minimize friction in all types of equipment from the smallest motors to the largest blooming mills. Whether you are designing new equipment or looking for efficient, economical replacement bearings, look confidently to SKF for expert, proved advice. Depend on SKF to help you put the right bearing in the right place. 7270-A

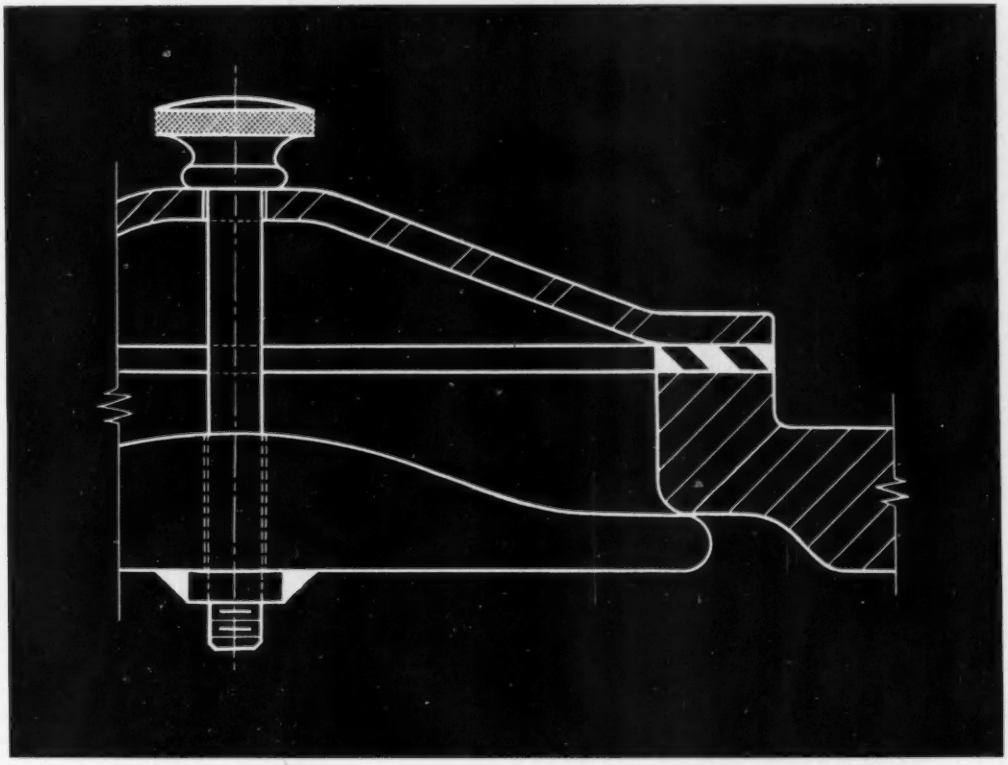
SKF

BALL AND ROLLER BEARINGS

8 REASONS WHY SKF IS PREFERRED BY ALL INDUSTRY

integrity • craftsmanship • metallurgy
tolerance control • surface finish
product uniformity • engineering service
field service

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.—*manufacturers of* SKF *and* HESS-BRIGHT *bearings.*



Military applications for cork-and-rubber gaskets

Here are answers to a few of the questions design engineers are asking us about military applications of cork-and-rubber gasket compositions.

Where is cork-and-rubber most useful in military applications?

Cork-and-rubber is used effectively to seal: (1) metal-to-metal joints, (2) stamped and rough cast parts, (3) joints which will be repeatedly opened and resealed in the field, and (4) in any application where it is desirable or necessary to combine the compressible and frictional qualities of cork with the solvent and weather resistant qualities of synthetic rubber.

Can cork-and-rubber be used in equipment intended for low-temperature operations?

Yes. Most standard compounds may be used at temperatures as low as −40° F. Special compounds may be necessary for use at lower operating temperatures.

Is it possible to replace another gasket material with cork-and-rubber and thus cut production time?

Yes. In a metal-to-metal joint, for example, flange faces are finished to the tolerances demanded by the assembly. The gasket and gasket channel, however, need not be held to close tolerances if a compressible gasket is used. A slightly oversized cork-and-rubber seal, square or rectangular in cross-section, distorts to the shape of the channel, compresses fully, and allows perfect mating of the flanges. It eliminates the need for either a relief for side-flow or its alternative, a molded gasket.

How well does cork-and-rubber resist fatigue?

Armstrong's Cork-and-Rubber Compositions have excellent resistance to fatigue. This, combined with their reduced tendency to cold flow, makes them ideal for applications in which joints are subject to frequent opening and resealing in the field.

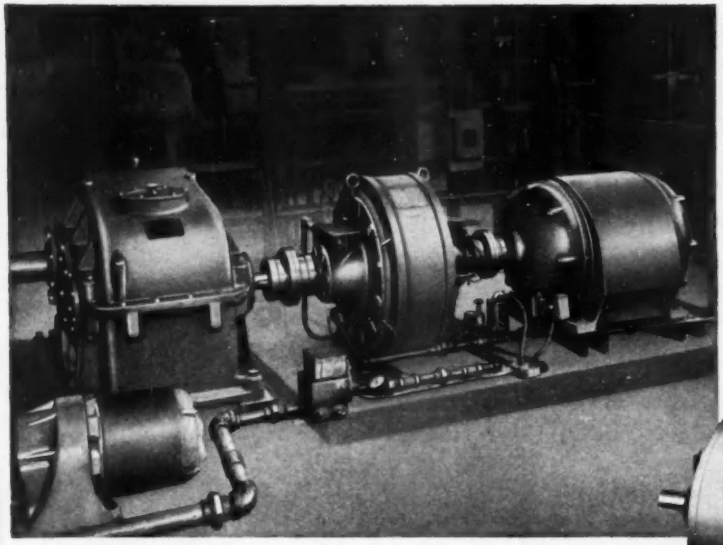
How effective is cork-and-rubber in sealing stampings?

In the drawing above, a cork-and-rubber gasket is used to seal a stamped diesel hand hole cover. The composition compresses easily into the irregularities of the stamping. At the same time, it is impervious and sufficiently resilient to form an effective seal under light bolt pressures.

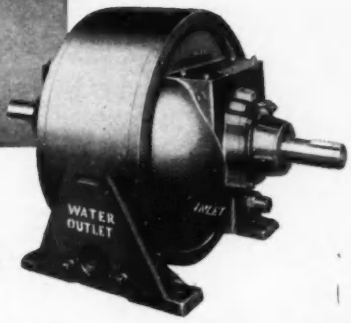
There is an Armstrong Composition designed to meet each of the six grades in MIL-G-6183 (formerly AN-G-32) covering cork-and-rubber gasketing materials. In addition, Armstrong's research laboratories are ready to develop new cork-and-rubber materials for applications for which no suitable material may be available.

For further information on Armstrong's Cork-and-Rubber Compositions and their application, call your Armstrong representative or refer to Armstrong's Gasket Materials Manual in Sweet's file for product designers. For a personal copy of this manual, write to the Armstrong Cork Company, Gaskets and Packings Department, 1506 Arch St., Lancaster, Pa.

ARMSTRONG'S *Gasket Materials*



Model 6-W Dynamatic Water-Cooled Coupling driving a calender in a large rubber manufacturing plant. Power is transmitted from AC motor, 100 H.P., 1200 RPM.



ELECTRO-MAGNETIC
DYNAMATIC
EDDY-CURRENT

WATER-COOLED POWER COUPLINGS

Provide Adjustable Speed Drive Direct from AC

The Dynamatic Coupling transmits rotation from a driving to a driven member without mechanical contact—with stepless adjustable control and with almost instantaneous response. It is a simple and effective method of providing adjustable speed from a constant speed source (or vice versa) with full-torque starts. The addition of an eddy-current brake will provide smooth controlled deceleration.

Effective water-in-the-gap cooling makes possible large capacity in small space, and the construction provides complete protection of the interior of the coupling against atmospheric impurities.

A standard range of sizes of Dynamatic Water-Cooled Couplings is available for transmitting torques of 50 pounds feet up to approximately 5,000 pounds feet. Many other sizes up to and including single units for handling 200,000 pounds feet of torque are in service and units of larger capacity can be built to order.

Write for Illustrated Bulletin WC-1.

WIDE SPEED RANGE

INSTANTANEOUS RESPONSE

ACCURATE SPEED CONTROL

STEPLESS SPEED ADJUSTMENT

SMOOTH TORQUE TRANSMISSION

TOTALLY ENCLOSED

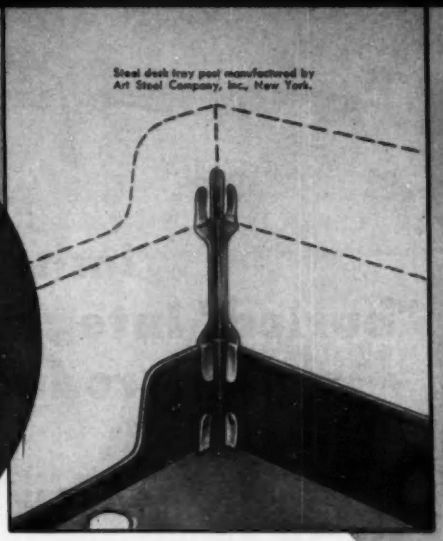
SIMPLE • QUIET

COMPACT • EFFICIENT

DYNAMATIC CORPORATION • KENOSHA WISCONSIN

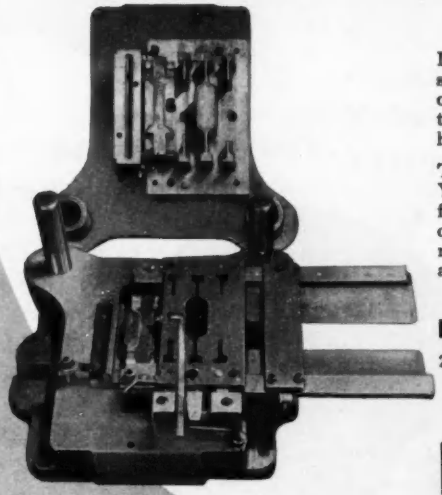
Subsidiary of **EATON MANUFACTURING COMPANY,** Cleveland, Ohio

Dynamometers • Oil Well Draw-Works Brakes • Adjustable-Speed Couplings • Eddy-Current Brakes
Adjusto-Spedes • Shovel Clutches • Press Drives • Lift Truck Clutches • Electronic Controls



they built the die in a

DANLY DIE SET!



Dependable, long wearing dies are a must in stamping the desk tray posts shown above because of volume production requirements. The dies have to be sturdy, too, to withstand the combination of high speed operation and heavy stock.

That's why Art Steel Company, Inc., of New York, chose a Danly Die Set. Outstanding performance in jobs like this has made them the first choice of die makers everywhere. Just call your nearest Danly Branch Assembly Plant* for quick attention to *your* specific die set needs.

DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue, Chicago 50, Illinois

PRECISION DIE SETS . . . STANDARD AND SPECIAL

***WHICH DANLY BRANCH IS CLOSEST TO YOU?**

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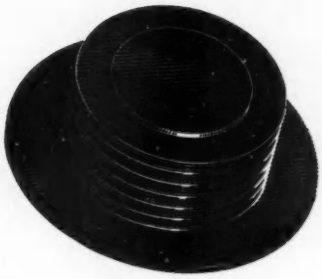
DANLY

More than 25 years of dependable service to the stamping industry

insist on "buried" integrity in your products

In the durable goods field most of the products are composed of many component parts. Acadia Synthetic Rubbers are contributing importantly to the superiority of thousands upon thousands of these products on land, sea, and in the air—from battleships to tiny instruments. For years manufacturers in hundreds of industries have found by experience that, with Acadia Synthetic Rubber parts in their products, they will never have trouble from that source. Acadia is a "buried" but vital component for products of highest integrity. Insist upon it!



• for every synthetic rubber requirement

- sheets
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- channel
- washers
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- bellows
- gaskets
- rings
- extrusions
- cut parts

Resists oil, age, wear, heat, light

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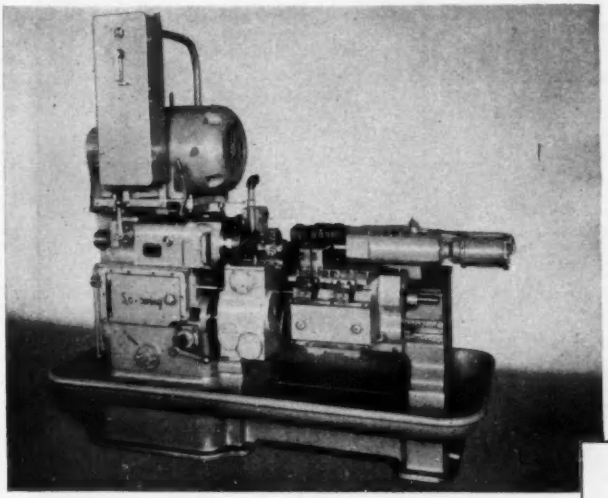
MACHINE OF THE MONTH

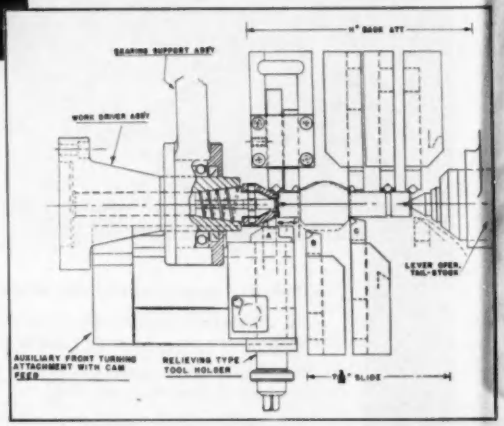
PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK



MODEL "LR" *Lo-swing* TURNS BOTH ENDS OF GEAR SHAFTS IN ONE OPERATION

Problem: Turn, square and chamfer both ends of Gear Shafts in a single operation.

Solution: The Model "LR" Automatic *Lo-swing* Lathe selected for this job was equipped with one standard two-slide front turning carriage, one 11" wide back squaring attachment and one special auxiliary front turning attachment arranged for feeding towards the tailstock. Tools A-B and C, as shown in the line drawing, start cutting simultaneously. Tool A feeds in the direction of the tailstock to the position shown by dotted lines, and then returns to the starting position before tools B & C, which feed towards the headstock, reach the end of their cut. All shoulders are faced and chamfered and one diameter grooved immediately after the front tools have ceased cutting. All slide movements are cam operated and cannot get out of time.

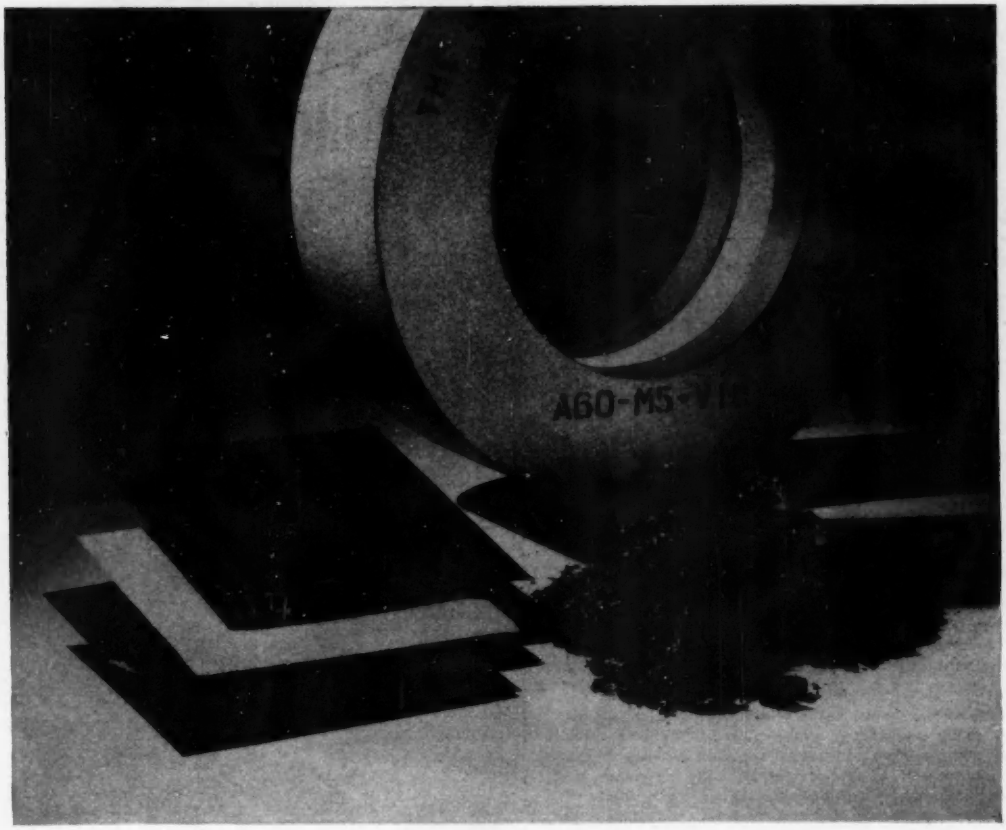


A spindle extension which runs in its own bearing, provides sufficient space for the auxiliary front turning attachment. Note also the balanced driver with two tongues which fit into a groove in the end of the gear shaft providing an efficient method of driving the gear shaft.

Seneca Falls engineers welcome inquiries involving difficult and unusual machining problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*



A complete line for complete results

Do you know when you are realizing the best available efficiency in your abrasive methods? Chances are, you're getting close if you buy abrasives by CARBORUNDUM. A *complete* line of abrasive products makes it possible for experienced CARBORUNDUM salesmen and distributors to recommend, and for you to select, that single abrasive product that will give you *complete* results. With the right product, you know you're operating at top efficiency, getting the most out of your abrasive methods, saving expenses, producing better.

Best of all, if an improvement comes along that is even *more* efficient than the abrasive product you are using at present, chances are a CARBORUNDUM salesman or distributor will be the first to know and recommend it to you.

Are you sure you're getting *complete* results? Your CARBORUNDUM salesman or distributor can tell you. Or write Dept. AI 80-27.

Only CARBORUNDUM
TRADE MARK

makes ALL Abrasive Products... to give you the proper ONE

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80-27

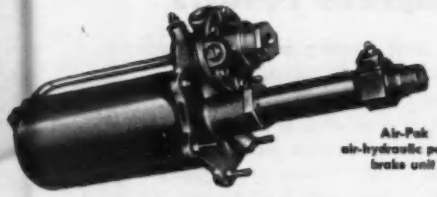
Either Way – YOU'RE ON THE ROAD TO BETTER POWER BRAKING!

There's no need to be puzzled about the question of efficient power braking for *any commercial vehicle*. Where the preference is for a hydraulic system, Hydrovac, with over two and a half million installations, has proven itself the undisputed leader in its field. And for vehicles where air actuated brakes are the choice, the new Bendix Air-Pak air-hydraulic power braking unit is foremost in its field.

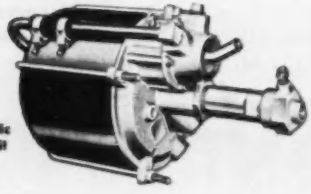
Air-Pak, similar in design and principle to the Hydrovac, changes air pressure into hydraulic pressure by means of two direct connected pistons, thus combining all the well proven advantages of hydraulic brake action with an air brake system.

Products of twenty-five years of practical braking experience, these outstanding power braking systems offer faster, more positive and better controlled braking. And in both the vacuum and the air actuated units, brakes can be applied instantly by foot power alone—a safety factor of tremendous importance. Remember, regardless of size of vehicle or whether your preference is for vacuum or air actuated brakes, for the industry's finest power braking systems—specify Bendix® Hydrovac® or Bendix Air-Pak.

®REG. U. S. PAT. OFF.



Air-Pak air-hydraulic power brake unit



Hydrovac vacuum-hydraulic power brake unit

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AVIATION CORPORATION

Bendix Products Division

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Cable Address Autoland, Philadelphia

High Spots of This Issue

Controlled Atmosphere for Reo Engine Assembly

Outstanding feature in the new engine final assembly department at Reo Motor Co. is a completely enclosed and sealed booth to provide cleanliness of all internal parts. Specific information, photographs, and floor plans begin on page 32.

More Turnpikes to Handle Traffic

Increasingly, high-speed turnpikes are receiving State and National attention, as vast gains in number of vehicles antiquate much of our once great road system. Here are presented aerial views, maps, statistics and discussion of these decidedly dramatic, distinctly different, "distance-diminishing" developments. Page 34.

Fast Fire Trucks Needed By the Air Force

Aircraft crash fires can create temperatures of 1000 to 1200 F in closed pilots' compartments—within thirty seconds. Air Force fire trucks must cover a mile in less than 90 seconds—from standing start. For other vital facts involved in fighting furious aircraft fires see page 38.

Cadillac Building Walker Bull-Dog Tanks

"Must" reading for all emergency-minded manufacturers are the remarkable methods employed by Cadillac in delivering—ahead of schedule—Walker Bull-Dog tanks to Ordnance. Epic effort put forth by General Motors has mushroomed a bare plant into a mammoth humming producer for the Military, within short months. Page 42.

GM's 19XX HC Engine

The article reveals interesting results of tests on a new experimental 12 to 1 compression ratio V-8 automobile engine developed by General Motors Research Laboratories. See page 46.

22 New Product Items And Other High Spots, Such As:

Design of two new Diesels; automatic clutch control introduced in France; Argentina to develop its own aircraft industry; a body design that reduces soldering joints; metals; variable rate suspension for French Renault car; and a new process for production of tetraethyl lead.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

AUTOMOTIVE INDUSTRIES COVERS
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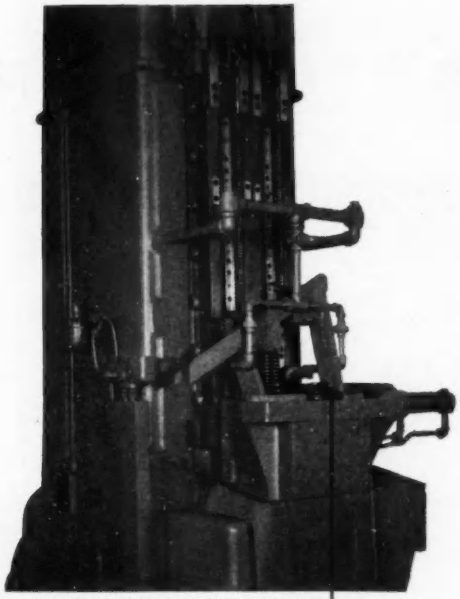
SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

All work and no play . . . for the machine . . . must have been the motto in mind when Cincinnati Application Engineers developed the equipment shown here. It's a CINCINNATI No. 5-54 Single Ram Vertical Hydro-Broach with an air-operated fixture which automatically loads and clamps four parts at one time (two stacks of two). ¶ The operator places four parts on the fixture, and the remainder of the operation is automatic. At the top of the stroke a pusher moves the work to the edge of the fixture, where the pieces drop into position on tapered pins and are pneumatically clamped when the ram descends. On the upward stroke, the finished parts are ejected into a chute. The ram cycle proceeds continuously, broaching 970 cams per hour.



CINCINNATI No. 5-54 Single Ram Vertical Hydro-Broach, tooled up by Cincinnati Application Engineers to broach the cam form and clearance on automotive cams.

970 cams per hour

HYDRO-BROACHED WITH THE HELP OF AUTOMATIC FIXTURE

This equipment may give you some ideas in raising production and saving manpower. It is typical of the work handled by Cincinnati Application Engineers. These men are willing to give you the benefit of their many years' experience in tooling up new Hydro-Broach machines carrying a "DO" rating. To obtain more information, the first thing to do is call the nearest Cincinnati Milling direct office or representative, or if you don't know who this is, write to the address below.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

Drawing of the cam broached on the equipment illustrated here. Color line indicates broached surface. Production 970 cams per hour.

CINCINNATI No. 10-66 Single Ram Vertical Hydro-Broach Machine. Seven sizes are available up to 10-ton broaching force, 66" stroke. Write for catalog No. M-1389-2.

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES
BROACHING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTING PROFILE GRINDERS • CUTTING FLUID

CINCINNATI

News of the AUTOMOTIVE INDUSTRIES

Vol. 104, No. 11 June 1, 1951

Packard First Quarter Earnings Show Drop

Like other automobile companies, Packard experienced a sharp drop in earnings during the first quarter of this year compared with the previous quarter. Net profit was just short of $2.5 million in the first three months compared with $6.6 million in the last quarter of last year. In the first three months of 1950, Packard had a loss of $259,586, after a tax credit of $161,000. At that time, however, new model costs were being absorbed.

K-F to Make Stampings for Fisher Body

Kaiser-Frazer has concluded an agreement with GM under which K-F will supply certain steel body stampings to GM's Fisher Body Div. The deal is advantageous to both parties since GM will get the extra steel which is to be supplied by K-F, and the latter will be able to utilize its excess press shop capacity which has considerable open time because of the cut in K-F car production. An interesting report is that K-F will work off an inventory of premium priced steel it accumulated before production was cut back, with future K-F steel needs supplied from regular mill sources at prevailing market prices. K-F has announced that it has lined up such a source.

Piasecki Has $4.5 Million Expansion Program

A $4.5 million expansion program is now underway at the Piasecki Helicopter Corp.'s plant at Morton, Pa. A 40,000-sq ft addition is going to be built to the present 103,000-sq ft plant during 1951, while during 1952 another 276,000-sq ft addition will be built.

Ford of Canada Surveys Production of Jeeps

Willys-Overland has concluded an agreement with the Canadian Government under which Ford of Canada will survey facilities in Canada for production of military Jeeps. The purpose of the survey is to help the government decide whether it would be desirable or economical to approve production of Jeeps to be used by the Canadian military forces. The study will also determine the extent of Willys cooperation in partial or complete production of the Jeep in Canada.

Willys First Half Net Far Above Year Ago

Willys Overland Motors Inc., with its defense contracts well underway, reports a sharp upturn in earnings for the six months ended March 31. Profit for the period was $3.1 million compared with a net loss of $908,307 for the comparable period last year. Willys currently has a backlog of unfilled orders and contracts under negotiation totaling more than $250 million.

Further Cuts Threatened in Car Production

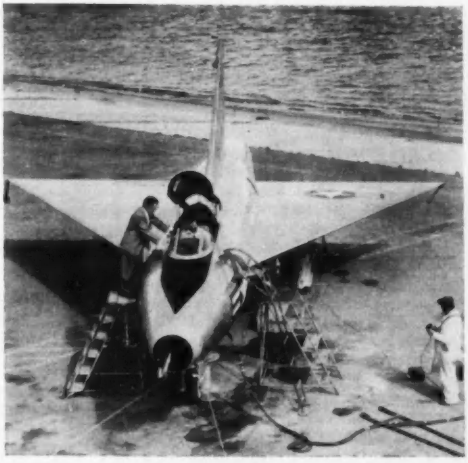
There is little doubt now that production of passenger cars will be reduced somewhat further in the third quarter—possibly by as much as 10 to 15 per cent. There is one thing that must be borne in mind, however, namely, that percentage cuts are predicated on the base period—the first six months of 1950. It is reliably reported that because of adjustments allowed by NPA to certain companies because of strikes or model changeovers in the base period, introduction of additional models, or other hardship reasons, the production base allowed the industry actually exceeds the number of units turned out in the first half of 1950. According to reliable sources, production through May of this year, despite the limitations on materials in the first quarter and the added 80 per cent steel use limitation order which went into effect March 1, will total about three per cent more than in the same period a year ago, because of the adjustments in individual company base period totals.

Admittedly, prospects look rather rough for the passenger car industry in the next three months, with NPA announcing that use of steel would be cut another ten per cent, bringing the allowable use to 65 per cent of the base period. Also for the first time, trucks are to be brought under materials restrictions, with tentative plans calling for steel for light trucks to be limited to 70 per cent of the amount used in the first half of 1950, medium trucks to 100 per cent, and heavy duty models to 120 per cent.

The whole problem of CMP is very confused, with automobiles at present not included and no assurance that trucks will be given CMP allotments. Truck builders had been sure that they would be blanketed-in and given allotments. However, the latest thinking is that NPA may include only heavy trucks under the plan, leaving builders

SONIC EXPLORER

Photographed at the San Diego, Calif. plant of the Consolidated Vultee Aircraft Corp., this is the USAF's XF-92A research interceptor, said to be the world's first delta wing aircraft. Ready to explore the sonic barrier, the plane is powered by an Allison J33-A-29 turbo-jet with afterburner.



of medium and light units to scramble for materials in the free market. However, it is significant that Courtney Johnson, head of the automotive section of NPA, said in Detroit recently that the "essentiality of the situation" rather than "essentiality of the product" might require automobiles to be put under CMP at a later date. This gobbledygook is interpreted to mean that if widespread unemployment results from further cuts in passenger car production, the industry will be brought under the CMP umbrella. The industry, in the main, is still very much opposed to being included in the CMP plan because it would result immediately in imposition of quotas, and industry fears that once controls are established, it will be most difficult to get rid of them. Automobile industry leaders are emphatically unconvinced that CMP will work. On the contrary, they are sure that it will strangle and collapse in a tangle of red tape and report forms. They fear further that not only will civilian production become completely snarled, but that the defense program itself will be in danger. They point to the initial NPA survey of material requirements for defense and essential industries which showed that demands for the third quarter totaled 40 per cent more than all the steel available in that period.

At the moment, all is confusion and chaos; neither the government nor industry has any idea where it is going. No one seems to have any clear idea as to what the steel alloted for defense purposes will be used for during the balance of this year. There are practically no major defense projects that would require such large quantities of steel anywhere near the production stage. In fact, most of the large materials-consuming projects are not scheduled to get going until early next year, and some are still more than a year away. There is considerable opinion that the civilian economy will bog down badly, requiring a frantic reshuffling of materials allocations to prevent large scale unemployment during the third quarter. As of now, there is no clear-cut analysis possible of just what is going to happen except that confusion will be the order of the day in the months ahead.

TO SELL FOR LESS

Known as Fageol-Liners, a new line of motor coaches to sell at lower prices, has been announced by the Twin Coach Co., Kent, O. Adopting structural components of mass-produced Fruehauf Trailer Co. Aerovan bodies, with modifications for motor coach use, Fageol-Liners will be produced in 30 to 52-passenger city type buses and in several intercity models. They will be powered by gasoline, propane or Diesel engines. Gasoline and propane units will utilize Fageol Twin Coach engines rated at 162 to 250 bhp. Diesel buses will be powered by Cummins engines, ranging from 150 to 275 bhp.

GMC Truck and Coach Adds to War Work

GMC Truck and Coach Div. of GM has been awarded nearly $3.5 million in contracts for tank trucks by Army Ordnance. The orders total 851 trucks which are standard models and will be built on the regular assembly lines.

U. S. Rubber Gets $30 Million War Order

The United States Rubber Co.'s mechanical goods division has announced that it has received orders totaling more than $30 million for the manufacture of self-sealing fuel cells for B-29 and B-47 bombers and rubber tracks for tanks and other tracked Army vehicles. Both products will be produced in the division's Fort Wayne, Ind., plant.

Willys Adds Two More Defense Contracts

Willys Overland has announced two new defense projects. The company will begin a multi-million dollar tooling program for production of landing gears for the C-119 cargo plane that Kaizer-Frazer will build at Willow Run. Willys is also planning to spend $2 million for tooling its Wilson Foundry and Machine Co. in Pontiac, Mich., for production of shell cartridge cases.

Continental Motors Floats $30 Million V-Loan

Continental Motors stockholders have approved a management proposal for a $30 million V-loan credit to finance military production. Thirteen banks will participate in the financing, which is for a two-year term. Tooling for the two engines which Continental is producing for the Armed Forces is nearly completed, and production is increasing rapidly.

K-F Starts Production of Cargo Plane Parts

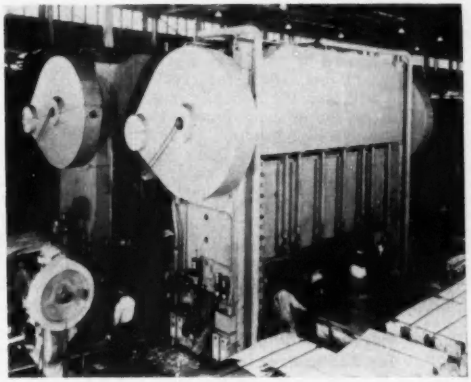
Kaiser-Frazer will start production of aircraft subassemblies in June for the cargo plane it will build at Willow Run late this year. The plant was closed down for 10 days in May to prepare for the start of aircraft production. Production of cars, however, has been resumed, and will be continued along with aircraft parts output. About 1000 employes are working on preparing the plant and the hundreds of machine tools that will be required are being installed at about 50 a week. K-F will use about a million sq ft of the plant area for aircraft production. Relocation and concentration of automobile facilities has required moving large spray booths and ovens and relocating 7080 ft of floor conveyors, 6200 ft of floor track, two trim lines totaling 3800 ft, and two 120 ft carrousel conveyors.

Machine Tool Builders Get Aid on Materials

Machine tool production during the third quarter of this year is expected to increase by about 30 per cent because of NPA action authorizing machine tool builders to use a defense rating for additional steel, copper, and aluminum. Manufacturers are expected

to get 40 per cent more steel, 30 per cent more copper, and 25 per cent more aluminum than they did in the first quarter. The priority covers 13 different types of machine tool classifications, including lathes, drilling and boring machines, rolling mill machinery and equipment, gear cutting and finishing machines, jigs, dies, and precision measuring tools. Other equipment such as furnaces and motor generators have been alloted 95 per cent of the aluminum, 100 per cent as much copper, and 105 per cent as much steel and iron as was used in the first quarter. Machine tool builders are happy to get the additional allotment of metals, but say that still more should be made available, and also that getting additional labor to expand capacity may be a problem.

BIG ONES



At the Ford Motor Co.'s Rouge plant, Dearborn, Mich., two of five giant rail presses are shown being installed in the frame and cold heading building. Specially designed with oversized crankshafts and flywheels to exert the rated 2000-ton capacity one inch above bottom stroke, the presses will be used to form automobile frame side members. Each press weighs half a million pounds, is 29 ft in height and measures 220 in. between the uprights. The presses were designed by E. W. Bliss Co. engineers at Toledo, O.

Industry Pessimistic on Car Price Relief

Although first quarter earnings for nearly all automobile companies showed sharply reduced earnings because of the price-cost squeeze and higher taxes, there is little optimism for any immediate price relief. Automobiles are still under a separate regulation, and although manufacturers theoretically can apply for relief on models on which they are losing money, OPS is paying scant attention to these appeals. One company has had a request for price relief on two models in Washington for nearly three months, and has not even received an acknowledgment of its appeal. It is reported that Washington is working on a price adjustment order for the industry, but whether it will come soon is doubtful. The squeeze on passenger car builders has been tightened by the four-cents-an-hour annual improvement factor and the cost of living increase estimated at three cents an hour, which took effect June 1. With volume slated to go down even further, and with labor costs up sharply, it is difficult to see how OPS can long ignore the disparity in price control treatment between the automobile and other industries.

Ford's Transmission Div. Holds Open House

At an open house held for the press at its Cincinnati plant, Ford's Automatic Transmission Div. revealed that it requires more than 700 machine tools to build the transmission. Nearly 100 of these were especially designed, incorporating principles and innovations new to the industry. All machines are equipped with individually fitted fixtures. Standard manufacturing tolerance at the plant is .0003-in., and the largest operation is machining the transmission case on a transfer machine line 135 ft long. When the cases emerge, all that is required are three relatively simple machining operations. Other complex machining operations performed on the new equipment are machining of the rear and front pump bodies in one continuous operation, high production slot piercing vanes, and finish machining of the upper and lower control valve bodies.

Ford also revealed that it will begin production in November of parts for the B-36 bomber engine that it will produce at the Chicago plant. The parts will be made by the Transmission Div. in a new 220,000 sq ft addition at the Cincinnati plant. The several hundred machine tools required are already on hand to produce the lubrication pumps, rocker arms, and other aircraft parts. When the new addition is completed total manufacturing at the Cincinnati plant will be 580,000 sq ft. Following the Ford open house, the group visited the Warner Gear Div. plant at Muncie, Ind., as guests of the Borg-Warner Corp. Warner gear is also producing automatic transmissions for Ford and Mercury.

1951 NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1951 Three Months' Totals

MAKE	March 1951	February 1951	March 1950	THREE MONTHS Units 1951	Units 1950	Per Cent of Total 1951	Per Cent of Total 1950
Chevrolet	110,166	88,810	121,764	313,499	305,921	22.15	23.78
Ford	85,497	72,056	108,157	239,116	259,612	16.89	20.18
Plymouth	52,175	46,030	12,921	137,517	85,334	9.72	6.63
Buick	42,969	37,237	48,768	117,902	109,907	8.30	8.54
Pontiac	33,468	28,150	38,768	99,980	96,568	6.99	7.51
Dodge	29,379	25,333	10,633	78,183	52,079	5.52	4.05
Oldsmobile	29,886	23,195	34,797	75,550	80,982	5.33	6.30
Mercury	21,521	20,694	28,696	65,175	66,866	4.60	5.20
Studebaker	19,561	17,338	29,942	55,321	65,212	3.91	5.07
Chrysler	15,967	11,423	5,022	39,963	26,080	2.82	2.03
Nash	11,619	9,973	14,549	32,820	31,346	2.32	2.44
Hudson	12,124	10,025	12,609	31,483	30,710	2.22	2.39
De Soto	10,212	9,230	3,637	29,333	16,693	2.07	1.45
Cadillac	6,965	6,384	7,631	26,810	14,211	1.89	1.10
Packard	7,088	6,134	6,776	20,222	15,462	1.43	1.20
Kaiser	6,423	5,379	3,521	17,335	8,484	1.22	.66
Henry J	6,592	4,726		15,868		1.12	
Lincoln	2,228	2,417	2,889	7,455	7,141	.53	.56
Willys	2,494	2,162	2,407	7,097	6,035	.50	.47
Crosley	597	488	616	1,627	1,694	.11	.13
Frazer			474		1,281		.10
British Austin	292	298	960	1,014	1,511	.07	.12
British Ford	198	247	96	736	239	.05	.02
Miscl. Domestic	79	11	9	287	76	.02	
Miscl. Foreign	1,079	1,037	421	3,170	973	.22	.07
Total—All Makes	512,589	430,797	495,885	1,418,162	1,286,437	100.00	100.00

*—Based on data from R. L. Polk & Co.

GM Loans $40 Million to Republic Steel

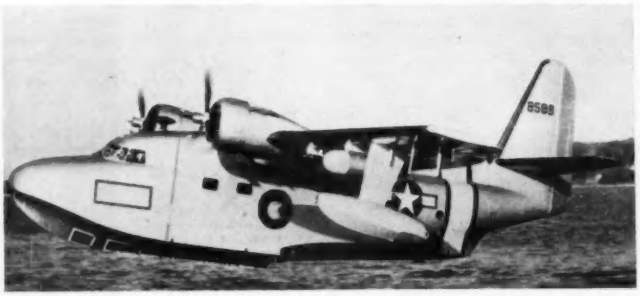
GM has agreed to loan another steel company additional capital for expansion. GM will loan the Republic Steel Corp. $40 million to help finance its five-year expansion program, which will cost $250 million. The funds will be borrowed from time to time, have no maturity date, and bear annual interest of three per cent. The loan is to be repaid according to the tonnage of steel products sold and delivered under the agreement. Late last year GM loaned Jones & Laughlin $28 million under a 15-year agreement.

Air Force Holding Clinics for Subcontractors

Enabling small businessmen to learn the needs of U. S. Air Force prime contractors, subcontractor clinics have been held in Chicago and Boston, and will be held in Detroit, Mich., Central Air Procurement District headquarters during July; Los Angeles, Calif., Western Air Procurement District headquarters; and Fort Worth, Tex., Southern Air Procurement District headquarters, dates and locations to be announced.

Bureau of Standards Reports on Battery Additives

Recent investigations by P. L. Howard and G. W. Vinal of the National Bureau of Standards have shown that battery additives — preparations frequently sold with claims that they will rejuvenate "dead" batteries — in fact have no effect on battery life or performance. Extensive laboratory tests simulating actual service conditions were made on a wide variety of commercial additives. The results show no significant difference between the batteries treated with these mixtures and similar untreated batteries used as controls.

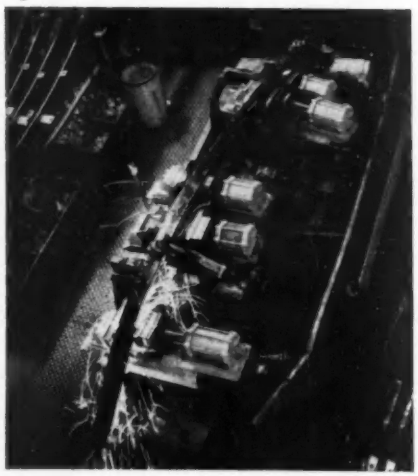


HULLS BY PLYMOUTH

Hulls for the Grumman Albatross air rescue plane shown above, will be produced by Chrysler Corp.'s Plymouth Div. at the latter's Evansville, Ind., plant. A two-engine amphibian, the Albatross' hull measures 60 ft long, 8 ft wide and 12 ft high and weighs approximately 4500 lb.

K-F Acquires Interest in Chase Aircraft

Kaiser-Frazer has acquired a 49 per cent stock interest in the Chase Aircraft Co. Edgar Kaiser, president of K-F, will become president and chief executive officer of Chase Aircraft, and other changes will be made to bring about immediate expansion of the management. Michael Stroukoff, who has been president, will become executive vice president and chief engineer, in charge of research and development. A new board of directors will be elected, with three nominated by Mr. Stroukoff, three by Edgar Kaiser, and two outside directors. The Chase organization will be enlarged to expedite existing production engineering contracts with the Air Force. Chase Aircraft was founded by Mr. Stroukoff in New York City in February, 1943. It moved to Trenton, N. J., in late 1946 and began construction of an all-metal glider. Later the company developed a twin engine troop and cargo carrying transport. Currently it is working on conversion of gliders to jet-powered transports.



LOOKING DOWN

Showing an actual frame welding process on the floor of the Chevrolet plant, this photograph demonstrates the automatic sequence of operation as it is controlled by Square D's Electronic Weld Control and sequence timer panels. Five points of contact are each controlled in four stages: squeeze, weld, hold, off. The entire sequence is initiated by one operator who places the copper in each unit, plugs it in, and thereby starts the operation automatically.

Bohn Aluminum Buys Indiana Plant

Bohn Aluminum & Brass Corp. has acquired a new plant at Greensburg, Ind., for additional capacity to produce engine bearings. The 100,000-sq ft plant will be used principally for aircraft and truck bearing production. Operations are expected to begin in about 90 days.

Cleveland Graphite Plans $25 Million Expansion

Cleveland Graphite Bronze Co. has started a $25 million expansion program involving purchase or construction of five branch plants. The company produces bearings and bushings for the automotive industries and for household equipment.

New Car Use Survey Released by AMA

The Automobile Manufacturers Association is just now publishing results of a nationwide survey made in January and February of this year on car use in the U. S. Conducted by a national research organization, the survey covered 700 localities in 36 states. The findings will be used in an intensive campaign to demonstrate to government officials and the public at large the essential nature of the automobile in today's economy. On the basis of distribution of trips made by passenger cars for various purposes the following conclusions were reached: (1) Each day 59 million, or 54 per cent of all adults in this country ride in cars. (2) On an average day in car-owning households, 50 million adults use passenger cars. (3) Nine million persons from non car-owning households depend on passenger cars every day. (4) Of all employed adults, 27.5 million, or 46 per cent, use passenger cars for earning a living. (5) Of those using cars to drive to work, 79 per cent do so five times a week or more. (6) Of all passenger cars used, 56 per cent is connected with making a living and/or shopping. (7) All occupational groups depend on passenger cars for earning a living. (8) Of all car use by men, 55 per cent is in connection with earning a living. For women the figure is 24 per cent. (9) Car use by women for shopping is 28 per cent and by men 15 per cent. (10) Cars bought on time payments show a higher percentage of use for livelihood purposes than those purchased for cash.

NPA Makes Sharp Cut in Nickel Shipments

Recent action by NPA prohibiting civilian users of nickel from obtaining more than 15 per cent of what they used on the average in the first six months of last year is largely academic so far as the automobile industry is concerned. Automobile companies were getting only about that amount anyway because of the critical nickel shortage. As a result they have been working on inventories, which they can continue to do provided their use does not exceed 65 per cent of consumption on a monthly average for the first half of the base period—the first six months of 1950. Principal use of nickel at present in automotive trim is confined to bumpers and bumper guards, and a few minor exterior hardware items.

Price Freeze and Taxes Cut GM Earnings

Effects of higher taxes and increased material and labor costs without a compensating increase in prices because of government regulations have reduced GM's earnings considerably during the first quarter of this year despite near record sales. GM earned $141 million on net sales of $1960 million during the first quarter of this year, compared with earnings of $212 million on sales of $1643 million in the same period a year ago. Earnings as percentage of sales dropped to 7.2 per cent compared with 11.1 per cent for all of 1950. It is interesting to note that GM set aside $264 million for estimated taxes, or an amount 87 per cent greater than its net earnings.

Imports of English Fords Test Light Car Market

The importation of the British Consul from the Ford Dagenham plant is considered to be more in the nature of an exploration into the small, light car field, than an effort by Ford to capture any sizable market in this country with the car. The four cyl, 100-in. wheelbase car is the first postwar model of the English subsidiary, and is said to include some of the features slated for the light car which Ford was developing immediately after the war, and which has since been shelved. Economically, the Consul is at a disadvantage in respect to American cars of the same general specifications, because it will deliver for about $1900, considerably above its present competitors—the Nash Rambler and Henry J. It will be sold on the basis of its unusually good fuel economy, ease of parking and maneuverability, excellent workmanship, and rugged construction. The Consul has an overhead valve engine, monocoque construction with a recessed floor, independently sprung front wheels.

Thompson Products Seeks Lease on Pa. Plant

Thompson Products Inc., is reported to be negotiating for lease of a 300,000 sq ft plant at Harrisburg, Pa. The plant which was acquired by the State of Pennsylvania after World War II, would be operated as a TP division for the manufacture of compressor blades, turbine buckets, and other jet engine parts.

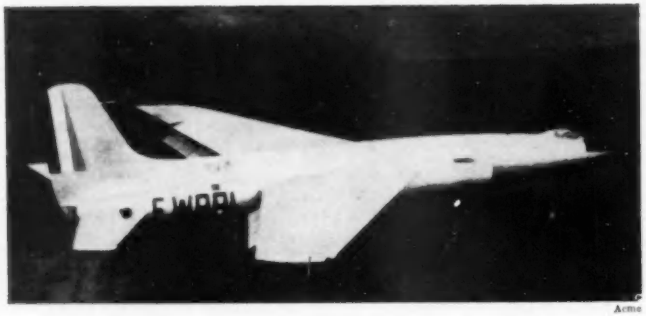
Automotive Export Market Shows Strong Uptrend

While sales of new cars in this country have softened considerably, the export market appears to be getting stronger month by month. If the rate of exports of cars and trucks during the first quarter of this year continues, 1951 sales abroad may total one-half million for the second best postwar year and the fourth best year on record. During the first quarter, 126,644 vehicles were exported or about six per cent of total production. While this figure, if it holds through the year, would not be up to the average of 10 per cent in most prewar years, it is about double the percentage prevailing in 1950. First quarter exports of cars, trucks, and buses were 118 per cent above the same period a year ago.

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	March 1951	February 1951	March 1950	Three Months 1951	Three Months 1950	Per Cent Change: Mar. over February	Per Cent Change: Mar. over Mar. 1950	Per Cent Change: Three Months 1951 over 1950
1	New England	30,373	22,979	26,853	80,017	68,085	+32.18	+13.11	+17.53
2	Middle Atlantic	100,267	73,188	91,003	254,094	239,084	+37.00	+ 9.10	+ 6.33
3	South Atlantic	57,372	50,641	54,603	171,790	153,951	+13.29	+ 5.07	+11.99
4	East North Central	140,349	111,076	122,934	388,934	314,163	+26.35	+14.17	+18.80
5	East South Central	26,719	18,463	28,170	69,605	71,851	+45.19	- 5.15	- 3.13
6	West North Central	49,199	47,489	49,709	142,122	125,667	+ 3.59	- 1.05	+13.09
7	West South Central	39,028	41,500	47,095	131,605	129,447	- 5.54	-20.27	+ 1.67
8	Mountain	17,632	14,636	14,074	48,679	40,340	+20.47	+25.28	+21.17
9	Pacific	52,969	50,858	59,944	158,516	143,849	+ 3.66	-12.14	+ 4.63
	Total—United States	512,599	430,797	495,985	1,410,162	1,286,437	+18.99	+ 3.37	+10.08

States comprising the various regions are:—Zone 1; Conn., Me., Mass., N. H., R. I., Vt.—Zone 2; N. J., N. Y., Pa.—Zone 3; Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va.—Zone 4; Ill., Ind., Mich., Ohio, Wisc.—Zone 5; Ala., Ky., Miss., Tenn.—Zone 6; Iowa, Kan., Minn., Mo., N. D., S. D.—Zone 7; Ark., La., Okla., Tex.—Zone 8; Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.—Zone 9; Cal., Ore., Wash.



Acme

FIRST TEST

This new French built "SO 4000" jet airplane recently made its first test flight at the Orleans-Bricy airfield in France. The plane is powered by two jet engines.

Sales abroad in March were nearly three times the level of the same month in 1950. An encouraging fact is that sales showed a steady upward climb month by month during the first quarter.

Chevrolet Aims for Top in Automatic Drives

Chevrolet is rapidly forging to the front as the largest manufacturer of automatic transmissions. In May Chevrolet completed its first one-half million automatic drives, approximately 17½ months after it started production in December, 1949. Buick, still the largest producer of automatic transmissions for one make of car, completed its 500,000th Dynaflow unit in May, 1950, about 28 months after the start of production. Since last October, however, Chevrolet has built 300,000 Powerglide transmissions in seven months and 12 days, which would be at an annual rate of nearly 475,000. Currently, nearly 40 per cent of Chevrolet production is equipped with the Powerglide unit.

Three Per Cent Hike Proposed in Car, Truck Excises

There has been little in the way of official reaction in the automobile industry to the House Committee's proposed compromise increase in Federal excise taxes on automobiles to 10 per cent from seven, and on trucks to eight per cent from five. Previously the Treasury had asked that automobile excise taxes be increased to 25 per cent. Certainly manufacturers and automobile dealers are unhappy about the proposed increase, and will continue their fight to defeat it before final passage. The increase in the truck excise tax was something of a surprise, since it had not been mentioned in the Treasury's original proposal. It has also been proposed that the Federal gasoline tax be increased from 1½ cents a gallon to two cents. In any event, it looks as though the motoring public and users of trucks will not escape higher taxes.

American Brake Shoe Plans West Coast Foundry

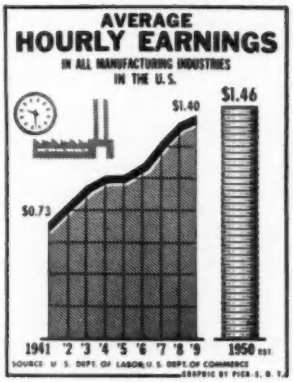
The American Brake Shoe Co. plans to build a million dollar mechanized foundry near Pomona (Los Angeles area), Calif. The proposed plant is expected to produce 1000 tons of brake shoes a month and employ 75 to 80 people when in full operation.

Canadian Credit Curbs Tighter than in U. S.

Automobile dealers and buyers who are opposed to the government's credit curbs on cars calling for ⅓ down and 15 months on the balance, still are better off than their opposite numbers in Canada. Regulations there require a down payment of 50 per cent on both new and used cars, with the balance to be paid off in only 12 months. In addition, the excise tax has been increased to 25 per cent from 15 per cent, and the sales tax to 10 per cent from 8 per cent. As a result, the combined excise and sales tax on a Ford custom 4-door sedan is $525, representing about 25 per cent of the manufacturer's price of the new car. In addition some local governments add further tax of their own. In this country, automotive manufacturers, dealers, and user groups are carrying on a vigorous fight against the government's proposal that the excise tax on new automobiles be increased to 20 per cent from the existing 7 per cent.

Ford Sets Up Scholarships for Employes' Families

The Ford Motor Co. Fund, a nonprofit corporation independent of the Ford Foundation, will award about 70 four-year college or university scholarships to sons and daughters of Ford employes. The Fund was organized for educational, scientific, and charitable purposes and is supported principally by Ford Motor Co. contributions. The scholarship awards will include tuition and fees and part of the winner's living costs. In addition, the Fund will contribute an annual grant of $500 to each privately endowed college or university for each Ford scholar in attendance.



Small Suppliers Play Large Defense Role

The role of the small supplier in the defense program is illustrated by the analysis of subcontractors and suppliers who will sell $250 million worth of materials and parts to Pratt & Whitney this year. Of the 5285 Pratt & Whitney subcontractors, about 90 per cent have fewer than 500 employes each and are scattered through 34 states. Pratt & Whitney is building both jet and reciprocating engines, requiring a total of 30,000 different parts from outside sources.

Hupp Corporation Shows First Quarter Profit

The Hupp Corp. has reported a net profit of $74,832 for the first quarter of this year compared with a net loss of $99,074 in the same period a year ago. The company started shipments in May of tank assemblies for the government. Production is also increasing on the new electric automobile window regulators which went into production in January.

Stainless Steel Replaces Brass in Thermostats

Because of the shortage of brass, one large manufacturer of automotive thermostats has substituted stainless steel for brass in the thermostat body. Some retooling was required for the changeover, but operation of the stainless steel unit is said to be entirely satisfactory.

Dow to Spend $100 Million on Expansion Program

Dow Chemical Co. is planning to spend $100 million during the next year on a company-wide expansion program, to be privately financed, but dependent on government priorities for materials. About $50 million would be spent for expansion of facilities at Freeport, Tex., with the balance allocated to other plants in Midland, Mich., Granite City, Ill., and on the West Coast.

1951 Machine Tool Output One-Third of '41 Total

The machine tool industry will be able to turn out this year less than one-third of the number of units it produced in 1941 when output totaled about 185,000 machines. R. E. Leblond, president of the National Machine Tool Builders Association, at the organization's spring meeting in Chicago, said that production this year will probably not be more than 56,400 machines. Officials of the group said that the lag in machine tool production may interfere with planned schedules in hundreds of war plants.

NPA Asks for $350 Million More for Tool Pool

The NPA has already committed the $100 million allotted to it initially to purchase machine tools in advance of needs of private firms. The agency is asking the Bureau of the Budget for an additional $350 million to continue the "pool order" program. If the allotment is granted, it will bring the total up to the $450 million request originally asked for the program. Under the "pool order" set-up, tools not required by private firms are purchased by the General Service Administration for 17½ per cent less than the regular purchase price and held until needed later in the defense program.

K-F Unit in Israel Builds First Car

The first Kaiser automobile to be built by Kaiser-Frazer of Israel Ltd., at Haifa, was completed late in April. The assembly plant there was financed largely by Israeli capital, and has a one shift capacity of between 20 and 30 cars a day. Some parts are shipped from Willow Run, with the balance being supplied by manufacturers in Israel. Kaiser-Frazer has five assembly plants outside the U. S., and a total of 109 distributors in 75 countries. In addition to the Israel operation, assembly facilities are located in Rotterdam, Canada, and Mexico, with a new unit nearing completion in Japan.

Link-Belt Building New Plant

The Link-Belt Co. has started construction of an engineering and manufacturing plant for the production of elevating, conveying and processing machinery, on a 43-acre site at Colmar, Pa. The new plant is designed for efficient straight-line manufacture from the receiving department at one end of an 880-ft long building to the shipping department at the other end. It will contain approximately 300,000 sq ft of floor space.

Automotive Industries May Reactivate ACWP

Reactivation of the Automotive Council for War Production is under consideration in the automotive industries. It is understood that there is some difference of opinion within the industries as to the advisability of reactivating the council at this time. A committee is studying the question, but no immediate decision is expected.

International Standards for Screws Proposed

Robert G. Cummings, supervisor of data and standards for Ford, is in England as the automobile industry representative at a conference on uniformity of screw, nut, and bolt sizes in the U.S., Canada, and Britain. He is one of six representatives of American industry attending the conference. Standardization of screw and nut sizes has been an objective for many years, and is again being actively promoted in view of the close cooperation between the three nations in military production.

K-F Using New Method to Cut Layout Time

Kaiser-Frazer has cut months off the drawing board time required for converting its Willow Run plant to combined production of airplane and automobiles through the use of a new development in scale model layouts.

1951 NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1951 Three Months' Totals

MAKE	March 1951	February 1951	March 1950	THREE MONTHS Units 1951	Units 1950	Per Cent of Total 1951	Per Cent of Total 1950
Chevrolet	32,170	26,883	33,854	86,337	81,246	34.14	34.44
Ford	21,358	19,017	27,967	61,272	65,401	24.23	27.76
Dodge	9,038	8,572	7,410	29,340	22,980	11.29	9.73
G. M. C.	8,702	7,941	8,147	25,610	18,981	10.13	8.05
International	8,292	7,691	8,909	24,104	21,302	9.53	9.03
Studebaker	2,492	2,459	4,530	8,146	11,529	3.22	4.89
Willys Truck	1,313	1,329	946	4,315	2,561	1.71	1.09
White	1,073	1,028	993	3,378	2,309	1.34	.98
Mack	1,088	1,051	659	3,094	2,386	1.22	1.01
Willys Jeep	621	710	878	2,015	1,836	.80	.78
Diamond T	456	379	492	1,242	1,273	.48	.54
Reo	366	363	275	1,128	755	.44	.32
Divco	326	348	294	1,060	805	.43	.34
Brockway	269	234	187	770	482	.30	.20
Autocar	235	147	147	571	388	.23	.16
Federal	94	100	99	308	273	.12	.12
Kenworth	55	76	46	206	96	.08	.04
Pontiac	51	48	183	185	467	.07	.20
F. W. D.	60	50	25	148	89	.06	.04
Peterbuilt	49	25	.....	96	.....	.04	.....
Sterling	33	10	33	94	76	.04	.03
Misc. Domestic	128	100	157	433	450	.17	.19
Misc. Foreign	20	10	33	59	131	.02	.06
Total—All Makes	88,287	79,581	96,266	252,928	235,889	100.00	100.00

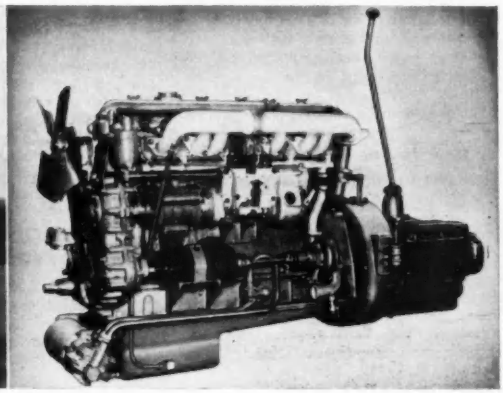
* Based on data from R. L. Polk & Co.

The layout technique is based on the construction of a new type three-dimension scale model, showing the exact location of every aircraft and automotive production item. The substantial saving in time is achieved by a new "grid sheet" process, by which the large number of blueprints required for machinery installation can be made directly from the base of the model layout, practically eliminating all drawing board time. Kaiser-Frazer estimates that the layout job, which was done by 60 men in two months, would have required the time of 160 men for six months by conventional methods.

Nat'l Seal to Expand in Ohio

Ground has been broken for construction of an addition to the plant of National Seal Co. which will add 40,000 sq ft of manufacturing area to the Van Wert, O., subsidiary of the National Motor Bearing Co., Inc. Also scheduled for the company's latest expansion are a rubber compounding building which will have an area of 4000 sq ft and a second floor to the present office building which will add 5000 sq ft.

in Detroit of a model 2250-hp GM high speed Diesel passenger locomotive. The survey disclosed that although 5201 fewer freight and passenger locomotives were in service in 1950 than in 1940, 30 per cent more work was handled, largely because of the greater capacity of Diesel engines. Diesel locomotives numbered less than 17 per cent of all those in use last year, but did 44 per cent of the work. It showed further that a typical steam locomotive last year hauled 2400 tons 15 miles in one hour, compared with 3000 tons hauled 20 miles in the same time by a Diesel locomotive.



THORNYCROFT'S LATEST

John J. Thornycroft Co., of England, has recently brought out a new truck (left) in the 10 to 12 gvw class. This Trident model is offered with either a 120-in. or 162-in. wheelbase. The tractor model with semi-trailer has a gvw of 16 tons. The engine (right) is a Thornycroft-designed, six-cyl Diesel of 3⅞ in. by 4¾ in. bore and stroke, with a compression ratio of 16 to 1, an output of 78 hp at 1900 rpm, and maximum torque of 332 lb ft at 1300 rpm. Cylinders and crankcase are one iron casting, with dry liners, two cylinder heads, and vertical valves operated by pushrods and rockers. The seven-bearing crankshaft has a diameter of 3⅛ in.

A feature of the driver's cab is that it is carried on a base consisting of the floor plates and cowling, and attached to the chassis at four points. This method of construction enables the cab to be built permanently on the cab base either while the base is on the chassis or removed from it.

Buick Retirement Club Unique in Industry

One of the most unique organizations in the automobile industry, is the Buick Retirement Club, composed of former supervisors and administrators who have retired but who meet annually at the Buick plant. The club is strictly an informal group without officers or rules. Current membership includes 132 former Buick employes, with an accumulated total of 4127 years' service at Buick. Founded in 1949, the club meets once a year as dinner guests of Buick, where they hear an off-the-record report on the company's plans from general manager, Ivan L. Wiles.

McCord Buys Factory for Gasket Division

The McCord Corp. has purchased the factory buildings and property of All Metal Products Co., in Wyandotte, Mich., a suburb of Detroit. The plant will be occupied by McCord's gasket division which will be moved from the present quarters in Wyandotte, which it has occupied for more than 30 years.

GM Survey Shows Benefit of Diesel Locomotive

GM has released some interesting results of a recent survey covering use of Diesel electric locomotives in connection with its display in the GM building

Pontiac Says Buyers Prefer Light Colors to Black

GM's Pontiac Motor Div. notes that the shift in color preference in automobiles away from black is continuing. Black was pushed out of first place in 1949, and so far in 1951 is in third position. Last year dark green led the list in color preference of buyers, closely followed by an opalescent light blue. Two factors are thought to be responsible for the shift to lighter colors; reflection of good economic conditions which tend to result in a preference for sprightlier colors among car buyers, and improved stability of pigments used in lighter paints during the past few years.

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Hiller Helicopters—**Frank A. Learman** has been appointed executive vice president and general manager.

Stewart-Warner Corp.—**Ephraim N. Osterberg** has been appointed director of purchases.

Rigidized Metals Corp.—**Theodore G. Kenefick** has been elected a director. **Robert G. Leary** has been elected vice president and general sales manager.

Kaiser-Frazer Corp.—The appointment of **Charles J. Leonard** as advertising manager has been announced.

Aetna Ball and Roller Bearing Co.—**J. J. Rozner** has been elected vice president in charge of operations. **J. E. Dillon** has been appointed chief engineer.

AiResearch Manufacturing Co of Arizona—**Murray S. Geiber** has been appointed vice president and manager.

General Motors Corp., Rochester Products Div.—**Ralph B. Knight** has been named general manager, succeeding **Thomas L. Lee** who is retiring.

Bell Aircraft Corp.—**G. B. Clark** has been appointed director of helicopter contracts.

Continental Motors Corp.—**G. Waine Thomas** has been elected a vice president.

American Chain & Cable Co., Inc.—**Wilmot F. Wheeler** has been elected chairman of the board of directors, and will continue as chief executive officer. He succeeds **Walter B. Lashar** who is retiring. **Cyrus N. Johns** has been named president, and **Col. Harry D. Weed** has been added to the board of directors.

Lockheed Aircraft Corp.—**I. P. Grunwald** has been named assistant comptroller.

Bendix Aviation Corp.—**George A. Lewthwaite** has been named general manager of the Pioneer Central Div. at Davenport, Ia., and **Charles A. Wolf** sales manager of Eclipse-Pioneer Div. at Teterboro, N. J. **Harold W. Giesecke** has been named assistant to the general manager of Bendix Radio Div.

The Trailmobile Co.—Appointment of **Marshall N. Terry** as director of advertising has been announced.

The Hydraulic Press Mfg. Co.—**O. Wendell Macy** has been appointed sales manager of the Hydraulic Power Div.

United States Rubber Co., Fisk-Gillette Tires Div.—The appointment of **John A. Boll** as sales manager has been announced.

Shell Oil Co.—**A. S. C. Hulton** has been appointed vice president in charge of transportation and supplies.

Davey Compressor Co.—**Everett A. Utecht** has been appointed assistant chief engineer.

Thermoid Co.—**Thomas G. Judd** has been named advertising manager.

The General Tire & Rubber Co.—**Melvin L. Hurr** has been appointed manager of factory personnel.

Fairchild Engine and Airplane Corp.—**William Preston Lane, Jr.**, former governor of Maryland, has been elected a member of the board of directors.

Libbey-Owens-Ford Glass Co.—**Robert E. Worden**, of Worden & Risberg, Philadelphia, will serve as general manager of the new Fiber Glass Div. during its development.

Lear, Inc.—At a recent meeting of the board of directors, **Paul Moore** was elected executive vice president and general manager. **Albert G. Handschumacher** was elected vice president.

Nash-Kelvinator Corp., Nash Motors Div., El Segundo, Calif.—**Duane A. Gouze** has been appointed assistant factory superintendent.

Nash-Kelvinator Corp., Nash Motors Div.—The announcement of five service appointments was made by W. A. Cook, national service manager: **F. W. Ohms**, to assistant service manager, Eastern Div.; **J. G. Slater**, to assistant service manager, Western Div.; **J. F. McFarlin**, to Chicago zone service manager; **A. E. Young**, to assistant service manager supervising fleet and Canadian service sales promotion; and **R. L. Rasch**, assistant technical manager, El Segundo, Calif.

Willys-Overland Motors, Inc.—**Stanley W. Wasil**, formerly national business manager for Packard Motor Car Co., has been named as assistant regional sales manager.

The Black & Decker Mfg. Co. — Alonzo G. Decker has been elected president, succeeding the late S. Duncan Black.

The Midland Steel Products Co.—William A. McKinley has been elected executive vice president.

Allis-Chalmers Manufacturing Co., — Boyd S. Oberlink has been named a vice president.

SKF Industries, Inc.—**Norman A. Strang** has been appointed advertising manager.

Chrysler Corp., Dodge Div.—**L. F. Desmond** has been appointed director of advertising and merchandising.

Towmotor Corp.—**Robert L. Fairbank**, formerly with Firestone Tire and Rubber Co., is joining the company as sales manager.

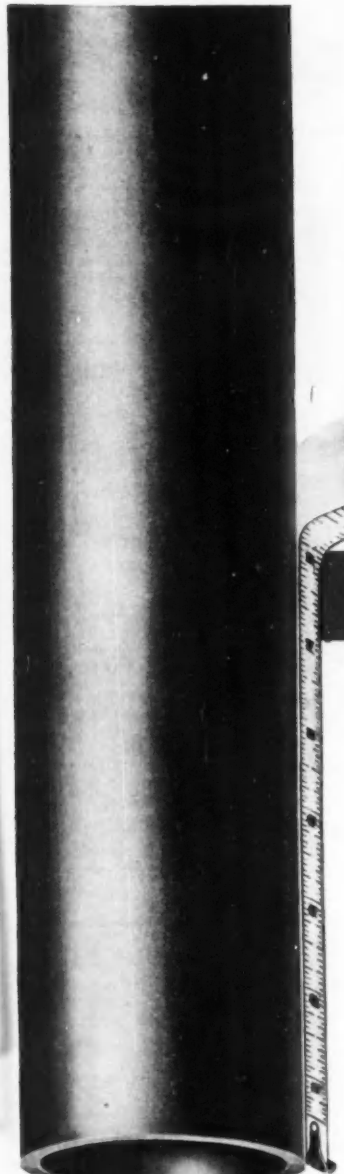
Necrology

William K. Norris, 75, a founder of the McQuay-Norris Manufacturing Co., died May 3 in Clayton, Mo.

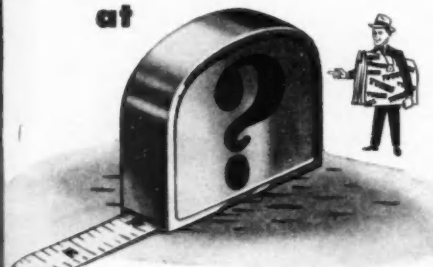
John R. Cautley, 67, a pioneer in the aviation industry, staff engineer, Bendix Products Div., Bendix Aviation Corp., former associate of the late Vincent Bendix, and vice president and a member of the board of directors of the old Perrot Brake Co., died April 24 in Martinsville, Ind.

H. E. Evans, 51, merchandising manager of the Willard Storage Battery Co., died recently in Cleveland.

James M. Barton, plant manager of GM's New Departure Div., died May 15 in Bristol, Conn.



Let's take a Closer Look at



tubing length

Here are the different kinds of length you can specify for all B&W Mechanical Tubing. Remember, as you go *down* the following list, the *price* generally goes down.

CUT LENGTH: close plus tolerance on a specified length; base price on lengths 10-24 feet . . . cut-lengths over 24′ and under 10′ cost more.

MULTIPLE LENGTH: suitable for cutting into smaller pieces of a specified length with negligible loss; up to 3½% saving in price.

SELECTED RANDOM LENGTH: specified minimum and maximum; up to 5% saving in price.

RANDOM LENGTH: no specified minimum or maximum; 5% saving in price.

Consider your product, production set-up, material handling, and stores facilities. Then fit your length-specification to the job, for initial savings and optimum scrap loss. New Bulletin TB-335 gives details on length and other descriptive terms, a clear understanding of which will simplify and facilitate ordering.

THE BABCOCK & WILCOX TUBE COMPANY

***Executive Offices:* Beaver Falls, Pa.**

General Offices & Plants

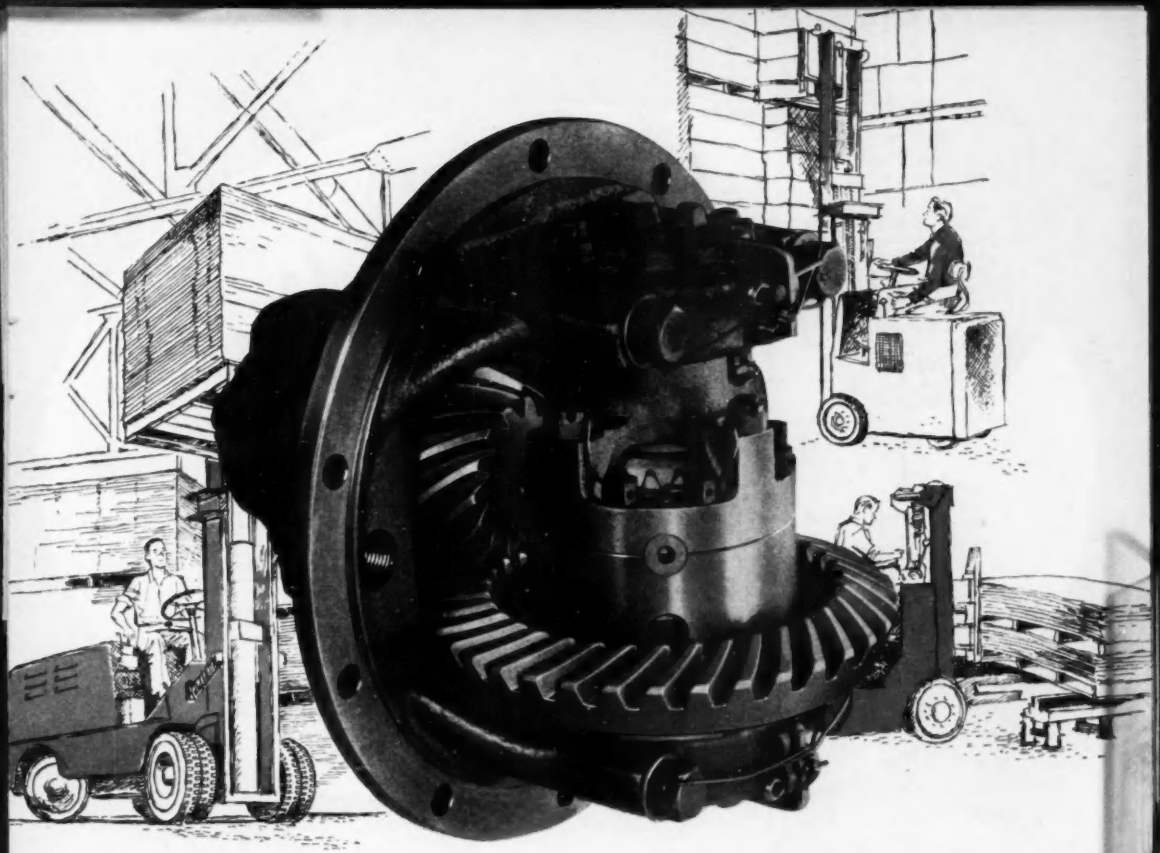
Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing

Alliance, Ohio—Welded Carbon Steel Tubing

Sales Offices: Beaver Falls, Pa. • Boston 16, Mass. • Chicago 3, Ill. • Cleveland 14, Ohio • Denver, Colo. Detroit 26, Mich. • Houston 2, Texas • Los Angeles 15, Calif. • New York 16, N. Y. • Philadelphia 2, Pa. St. Louis 1, Mo. • San Francisco 3, Calif. • Syracuse 2, N. Y. • Toronto, Ontario • Tulsa 3, Okla.

B&W SEAMLESS and WELDED TUBES

TA-1630-M



Muscle for America's favorite WORK HORSE

A great development of all-round usefulness to American industry is the fork lift-truck. Today, these swift, efficient machines are pacing the flow of materials in almost every American industry.

In thousands of fork lift-trucks you'll find transmission and differential assemblies made by Automotive Gear Works, Inc. Few gears of any type are exposed to such constant, heavy-duty use. This is particularly true now with increased three-shift production; with trucks working on every kind of flooring and terrain, rough or smooth, indoors or outdoors; and often handling loads greater than recommended capacities. Even under these circumstances "Double Diamonds" are providing dependable, trouble-free "muscle" for hosts of these hustling work horses.

The fact that "Double Diamond" Gears are preferred by leading fork lift-truck manufacturers may suggest the advisability of calling in a "Double Diamond" engineer when you next need gears of the many types we manufacture.

DOUBLE DIAMOND GEARS
TRADE MARK

AUTOMOTIVE GEAR WORKS, INC.

RICHMOND, INDIANA

FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS

☆ Reg. U. S. Pat. Off.

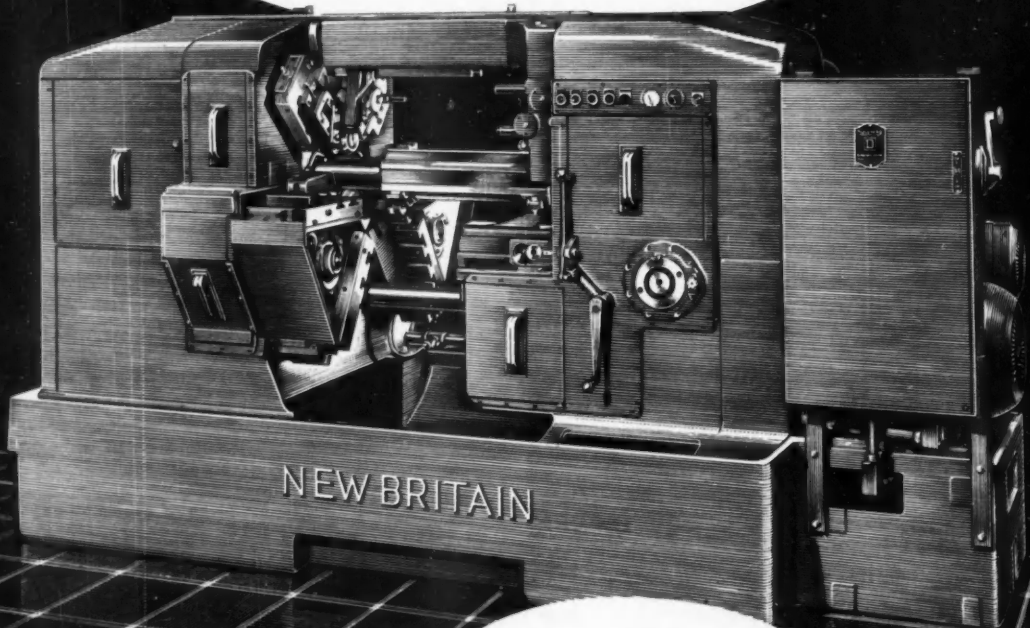
Greater Productivity

... More Horsepower ... Less Man Power

TODAY American Industry is under pressure to meet fantastic demands. Only yesterday, intense competition was the problem. Manufacturers have found the answer to both situations in more productive machine tools. The New Britain-Gridley Division, The New Britain Machine Company, New Britain, Conn., U.S.A.

AUTOMATIC BAR AND CHUCKING MACHINES • PRECISION BORING MACHINES

LUCAS HORIZONTAL BORING, DRILLING AND MILLING MACHINES



NEW BRITAIN

Automatics

Other engineers are finding many new uses for this new SR-4® device . . . *How about you?*

Further expanding the engineer's field of exact knowledge, the Baldwin SR-4 Fluid Pressure Cell opens entirely new opportunities in the precise measurements of both stable and fluctuating pressures in all types of fluids.

Heart of the cell is a pressure-sensitive tube with an SR-4 strain gage grid bonded to its exterior. Gas or liquid to be measured enters this tube, causing it to expand, which stretches the fine wire in the grid. The consequent alteration in electrical resistance, calibrated in p.s.i. or other units, is measured by an indicator or recorder, or actuates monitor or alarm apparatus.

The cell is easily installed, and is adaptable to use with all types of fluids—corrosive or non-corrosive—and over a wide range of pressures. A wide variety of indicating, recording and controlling instrumentation is available to meet your particular requirement. Calibration inaccuracy is not more than ¼% of full range at any point from 0% to 100% of capacity, and this measuring performance is maintained under hundreds of thousands of pressure cycles. The unit is extremely responsive to pressure fluctuations making it invaluable for research on surges and similar pressure fluctuations, and explosion studies. For more detailed information, ask for Bulletin 306. One of our representatives will be glad to discuss the application of these cells to the solution of any fluid pressure measurement or control problem you may have.

BALDWIN BLH LIMA-HAMILTON

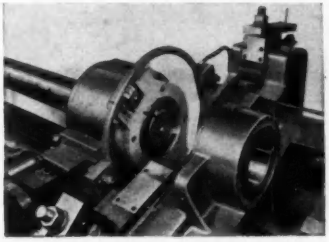
BALDWIN-LIMA-HAMILTON

TESTING HEADQUARTERS

EDDYSTONE DIVISION, BALDWIN-LIMA-HAMILTON CORPORATION, PHILADELPHIA 42, PA.

In Canada: Peacock Bros., Ltd., Montreal, Quebec

How 9 DIESEL ENGINE MAIN BEARINGS ARE *Line-Bored Simultaneously*



Close up view showing outboard bar support. The support also carries the cutter head for boring and facing the 25" diameter generator rabbet. The boring bar is equipped with feed-out slide which permits straddle-facing the No. 1 Main Bearing. Slotted rotating bushings are locked automatically when bar retracts.

with **W. F. & JOHN BARNES No. 432 SINGLE-END MACHINE**

● Nine main bearings, 9-3/8" diameter x 4-1/4" wide, are line-bored simultaneously, a front main bearing straddle-faced, and a 25" diameter generator rabbet is bored and faced in 16-cylinder Diesel Engine Crankcases by this sturdy Barnes Single-End Machine. Only one positioning and clamping of the workpiece in the machine is required. Rough and finish boring operations are completed without adjusting tools between cuts. Diameters and parallelism are held to extremely close limits.

Hydraulic Shifting of Workpiece Eliminates Removal of Bearing Caps

The boring bar is 7" in diameter and 15 feet long. The bar advances through slotted, rotating-type bushings. Hydraulic shifting of the workpiece permits advancing and withdrawing the boring bar without removing tools and bearing caps. Thus, with work handling reduced and machining operations simplified, productivity is substantially increased.

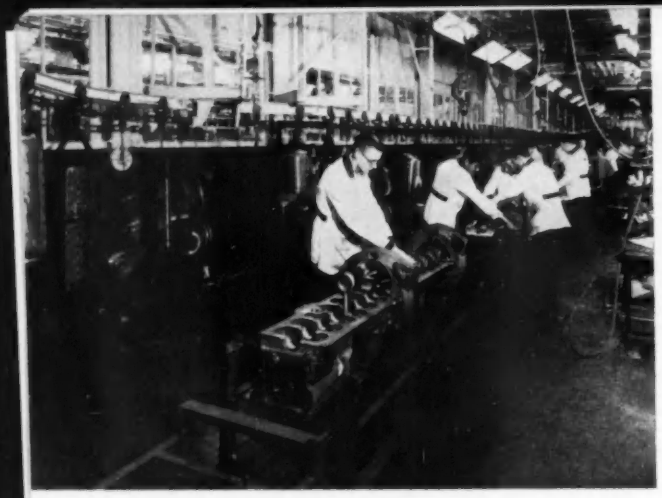
Write FOR COPY OF "SPECIAL MACHINE TOOLS FOR DIESEL ENGINE OPERATIONS"

For more information on machines especially designed and built for Diesel Engine operations, write for copy of 48-page catalog. Gives details of machines, tooling, and operations on a wide range of jobs.

W. F. & JOHN BARNES

W. F. & JOHN BARNES COMPANY
312 SO. WATER ST., ROCKFORD, ILLINOIS

MULTIPLE SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC PROGRESS-THRU AND TRANSFER TYPE MACHINES



Perspective within the enclosed engine assembly room at the start of assembly operations. This line proceeds from left to right in this view. The monorail feeder conveyor along the wall in the background transports component parts from the machine shop to the assembly line.

By Joseph

Controlled Enclosure of Reo

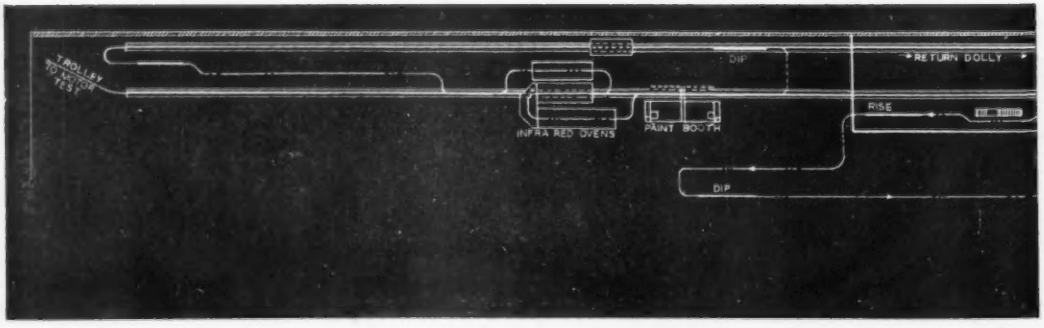
FRUITION of a major program designed to facilitate the production of Reo Gold Crown engines, with emphasis upon precision and cleanness, is found in the development of the new engine final assembly department at Reo Motor Co., Lansing, Mich. An outstanding feature of this layout is the introduction of a completely enclosed and sealed booth for the initial stages of engine assembly right up to the point of installation of valve covers and accessories. The chief objective is to insulate engine assembly from the machine shop area, thus preserving the cleanness of all internal parts and assemblies by working in an area free from dust and dirt.

Because the assembly operators work in a sealed enclosure, this booth has been fitted with an air-conditioning unit, supplying filtered air under pressure through a system of multiple duct outlets. The system is so adjusted as to maintain a comfortable working temperature.

What has been accomplished in a search for the best way to produce clean engines having long life can be visualized by following the floor plan reproduced here. Starting at the extreme right of the enclosed assembly line is a controlled temperature room —held at a constant temperature of 70 F—where selective fitting takes place of pistons and sleeves, rods and piston pin bearings. As the sets are made up for individual blocks they move out of the room through a three-stage Blakeslee washer and then enter the assembly enclosure.

Component parts for engine assembly are delivered to the assembly line on the closed monorail conveyor

Floor plan of the new Reo engine assembly department, showing movement of work through the temperature controlled booth at the extreme end, delivering piston and sleeve assemblies into the



The engine dress-up line, making engines ready for final test, starts immediately outside the enclosure, part of the final line being seen here.

Geschelin

Atmosphere for Assembly Engines

which picks up parts such as oilpans, crankshafts, flywheels, etc., from storage bins outside of and directly adjacent to the assembly line, moves them through the three-stage Triplex Engineering washer to clean them thoroughly before entering the assembly enclosure. This parts conveyor has a developed length of 350 ft.

The engine is integrated on the power-driven floor conveyor while mounted on a special dolly, progressing from right to the left. Actually the engine assembly line—including the final dress-up line at the extreme left outside of the enclosure, runs some 400 ft, about 200 ft of this being within the enclosed area.

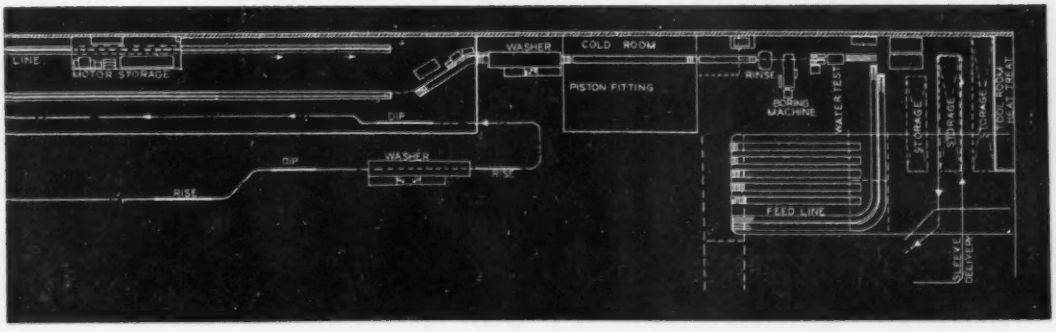
As the engine line leaves the enclosure, while still on the floor conveyor, the valve covers and certain other accessories are installed. Then the engines are fitted with eye-bolts and suspended from the monorail conveyor for transport through the Newcomb-Detroit paint spray booth, followed by several U-turns carrying them through the Acme infra-red drying tunnels and finally out of the cooling tunnel.

The monorail then returns to its path directly over the floor conveyor to the left and dips within reach of the operators to permit engines to be taken off the conveyor and loaded onto the assembly dolly. This closed conveyor system runs about 325 ft in developed length.

Assembly operations then continue on the floor conveyor to complete the installation of all accessories, ready for block testing. At the extreme end of the assembly line completed engines are fitted with a

(*Turn to page* 82, *please*)

enclosed air conditioned engine assembly department. The dress-up line begins just outside the assembly room. At the extreme left is a trolley to the engine testing department.



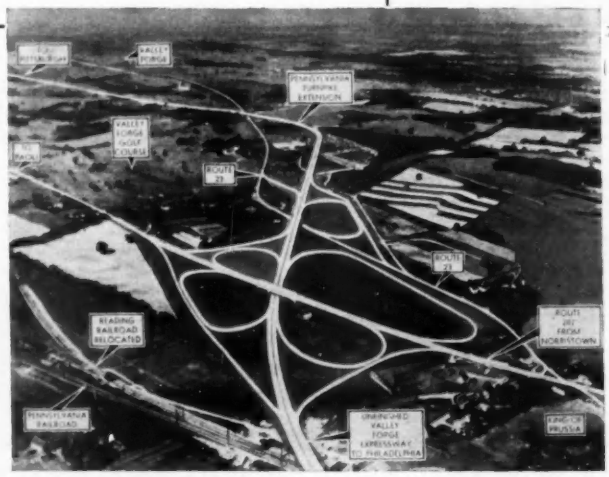
More Turnpikes to

By Thomas McNew

STATISTICS OF TOLL ROADS IN OPERATION

	Length (miles)	Surface Width	Average Daily Traffic: Passenger Cars	Average Daily Traffic: Trucks and Buses	Approximate Cost of Construction
CONNECTICUT					
Merritt Parkway	37.46	52 ft – divided	16,940	0	$20,592,000
Wilbur Cross Parkway	5.40	42 ft – divided	11,466	0	$ 2,300,000
MAINE					
Maine Turnpike	42.90	48 ft	3,350	336	$20,600,000
NEW HAMPSHIRE					
New Hampshire Turnpike	14.00	— — —	7,407**		$ 6,800,000
NEW YORK					
Saw Mill River Parkway	25.00	40 to 44 ft – divided	32,500	0	$ 8,000,000
Hutchinson River Parkway	14.52	40 to 44 ft – divided	13,900	0	$ 6,000,000
PENNSYLVANIA					
Pennsylvania Turnpike	259.60	78 ft* – divided	4,309	1,478	$120,000,000

*—Includes two 24-ft lanes, 10-ft parkway, and two 10-ft shoulders
**—No breakdown given between trucks and passenger cars.
Source: Dept. of Commerce—Bureau of Public Roads.



This is the Eastern terminus of the Pennsylvania Turnpike which now extends from King of Prussia (outside of Philadelphia) to a point close to Pittsburgh. (Acme Photo)

Many interchanges, such as the one shown, are located along the Pennsylvania Turnpike to permit easy entrance and exit without traffic congestion. This particular one is located near Harrisburg along the Eastern extension of the express highway. (Aero Service Corp. photo).

Handle Modern Traffic

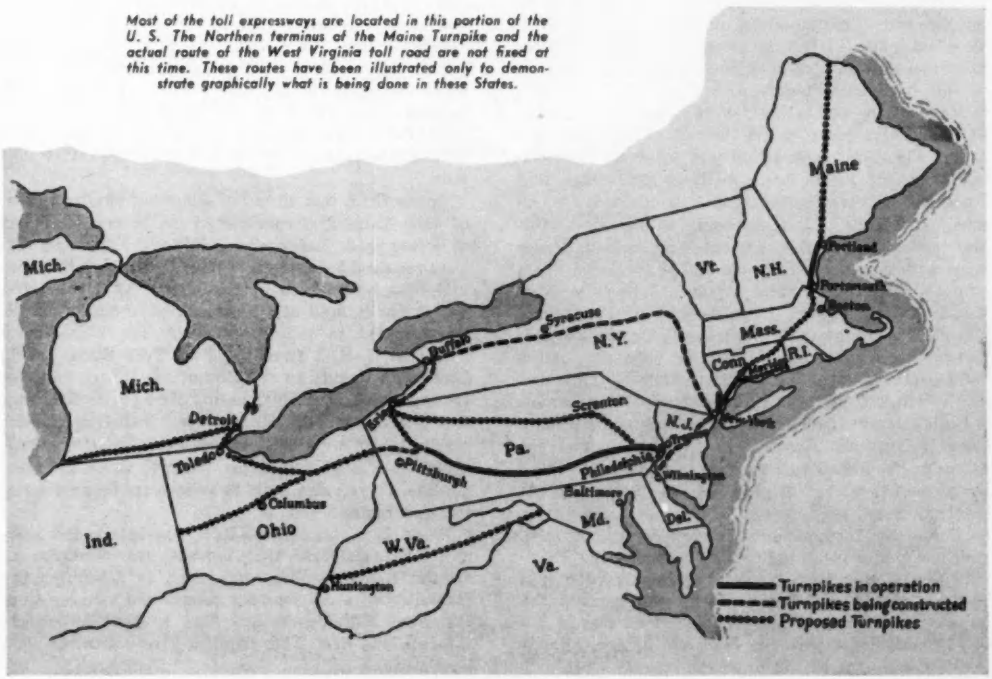
From the resumption of civilian vehicle production at the closing of World War II until the present, there has been an extremely rapid increase in the number of licensed road vehicles in the United States. Partially brought about by a car-starved country and high personal and corporate savings during the war years, the number of cars, trucks, and buses registered in 1950 had increased by approximately 59 per cent over 1945 to a total of 48,283,335. This vast gain in the number of vehicles traveling on the highways today has largely antiquated much of our once great road system, and has caused both the National Government as well as State Governments to give increasing consideration to additional high-speed turnpikes. It is commonly proposed that such expensive undertakings should be paid for by tolls levied on the users.

Back in the late thirties and early forties the States planned for a somewhat larger amount of traffic in the next decade, and roads constructed at that time were based on their very conservative registration estimates. Some States, particularly a few in the East, took a farsighted view and built high-speed toll expressways that were planned to relieve future traffic congestion. Today, the Federal Government and over half of the States have toll road bills before their respective legislative bodies.

Of the Congressional bills, two have been placed before the House and one before the House and Senate. Proposed House Bill H. 80 would create a National Superhighway Commission composed of nine members who would be directed to make plans of, and conduct surveys for, a system of superhighways and airports. The Commission would cease to exist not later than five years from the date of enactment.

Another document before the House—H. 3120—would set up a new Federal corporation, the Transcontinental Streamlined Highway Corp., which would be empowered to issue bonds in the amount of $12 billion. Superhighways would be constructed according to plans prepared by the Chief of Engineers of the U. S. Army. The TSHC would be authorized to levy

Most of the toll expressways are located in this portion of the U. S. The Northern terminus of the Maine Turnpike and the actual route of the West Virginia toll road are not fixed at this time. These routes have been illustrated only to demonstrate graphically what is being done in these States.



An unusual highway layout is depicted here. This is a tri-level crossing along the New Jersey Turnpike.

and collect toll charges on the roads they build.

Bill H. 1954 and S. 825, which is before the House and Senate, would create the Crozet Superhighway. This road would extend diagonally from Boston to the west coast using present and proposed toll roads adequate to carry the traffic. The Commission would consist of three members and it would have the authority to sell revenue bonds and levy and collect toll charges in any section that is built.

These pending Congressional bills, however, are not receiving any serious consideration by the Federal legislatures. This situation may be due to the long-standing policy of the Government in advocating the free-road idea on highways financed, either in part or in full, by Federal assistance.

Many of the States, on the other hand, have taken and are taking a very active interest in turnpike legislation. The first such action was taken by the Commonwealth of Pennsylvania back in 1937 when that State started construction of the Pennsylvania Turnpike. Originally, this route—built to provide a modern traffic facility through the Appalachian Mountains with a low rate of grade and slight curvature—extended 159.6 miles from a point 16 miles west of Harrisburg to a point 15 miles east of Pittsburgh. Recently, the highway has been lengthened by approximately 100 miles from Harrisburg to a destination outside of Philadelphia. Another extension is under way which will take the turnpike to the Ohio border.

Legislation in effect since 1949 authorizes the Pennsylvania Turnpike Commission to build a northern extension from Scranton to Erie and to connect with the present turnpike. A proposed bill—S. 305—would construct a toll road connecting with the eastern extension of the turnpike and the New Jersey toll road, which is under construction. It provides the Turnpike Commission with the authority to construct a bridge across the Delaware River and permits the issuance of bonds to finance the estimated cost of $50 to $55 million for both the road and bridge. Bonds would be paid for by toll proceeds.

Across the Delaware River from the Pennsylvania express highway, the New Jersey toll project becomes the first high-speed superhighway link to New England. This major route will extend from the Delaware River in the southwestern part of New Jersey to Hudson River crossings leading to New York City. Cost of the 130-mile project is estimated at over $200 million.

New York was probably the first state to build superhighways. Two rather short free expressways were started back in 1922 and were finished in 1927. A toll, however, was levied on these highways starting in 1947. The expressways—the Saw Mill River Parkway and the Hutchinson River Parkway—were planned for the relief of pleasure vehicle congestion through Westchester County. They were built at a cost of approximately $14 million. Anther project, presently under construction, is the 500 mile New York Thruway extending from New York City to Buffalo and then to Erie, Pa. Unlike other toll roads, it is proposed that this road be paid for by special license fees rather than tolls.

Connecticut, in a situation somewhat similar to that of New York, first constructed the Merritt Parkway as a free road. Later when additional highway funds were required to build the Wilbur Cross Parkway, both highways became toll facilities. The 37½ mile Merritt Parkway, built at a reported cost of $20½ million, was planned to relieve passenger car high-density traffic on U. S. 1 from the New York State line in Greenwich County to the Housatonic River. Actually, the average daily traffic passing through its toll gates amounts to some 17,000 cars—not including vehicles making short trips between its several toll-free interchanges. The Wilbur Cross Parkway joins the Merritt and it was also built to relieve traffic on heavily traveled routes.

There is a resolution—HJR 24—before the Connecticut Legislature that requests the Governor to appoint a five-member commission to determine the feasibility of a toll road for commercial vehicles from the New York-Connecticut line to the Conecticut-Rhode Island line. This requires a report to the 1953 legislature.

to Handle Modern Traffic

Massachusetts recently started a study of a proposed toll road extending from the Connecticut line to the New Hampshire line, and the first investigation ended with an unfavorable report. Nothing further has been reported.

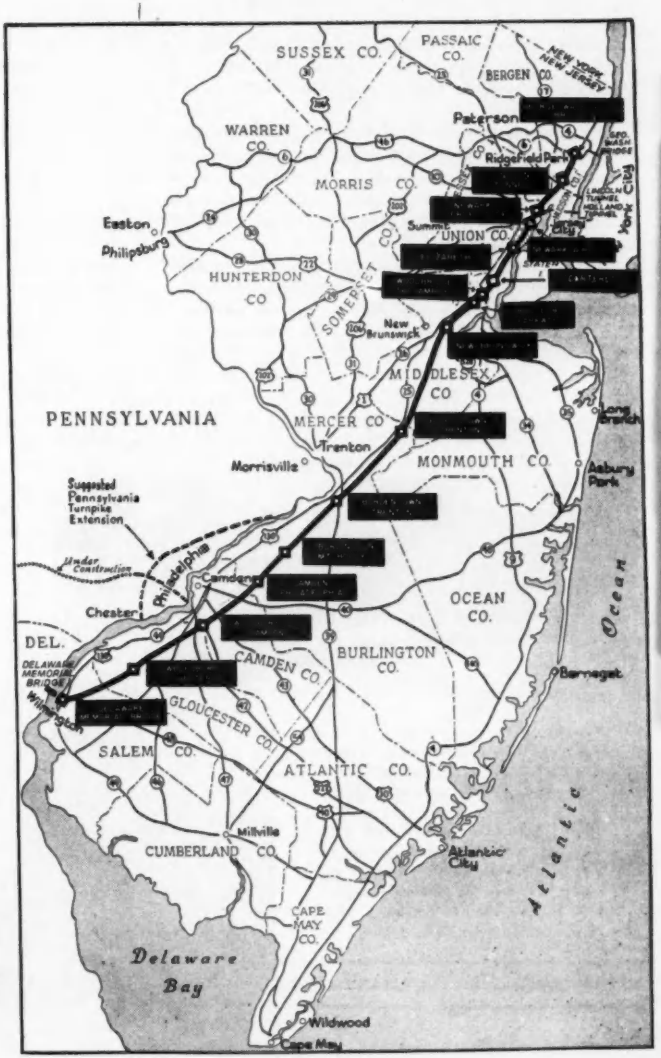
During the summer of 1950, New Hampshire opened a 14-mile turnpike between the Massachusetts border and Maine. No future legislation is planned by the State at this time.

Connected to the New Hampshire Turnpike is the 42.9 mile Maine Turnpike from Kittery to Portland which was completed late in 1947. Planned primarily to alleviate traffic congestion on U. S. 1, the toll road is eventually to be extended to the Canadian border Present bills to be acted upon by the State Legislature propose funds for this extension. Bill H. 685 amends the 1941 Turnpike Act to provide that refunding bonds may be issued for the purpose of improvements or extensions of toll roads. Another document—H. 686—requires the State Treasurer to pay the State Turnpike Authority the portion of gasoline tax attributable to mileage traveled over the present toll road. Such funds would be used to pay for traffic and engineering studies for extension of the present road.

Excepting for the states mentioned above and two Western States—Colorado and Oklahoma—there are no other toll roads under construction at present. Colorado is building 34 miles of expressway from Denver to Boulder, and the State of Oklahoma has a 119-mile superhighway from Oklahoma City to Tulsa in the construction process. Neither state is currently considering further legislation governing toll facilities.

There are, however, a few states—Ohio, West Virginia, Georgia, Virginia and North Carolina—that have specific legislation authorizing toll roads which

(*Turn to page* 96, *please*)



The New Jersey Turnpike, which is presently under construction, will extend from the Hudson River across from New York City to the Delaware Memorial Bridge in the Southwestern part of New Jersey. Estimated cost of this ultra-modern highway is over $200 million.

Air Force Needs Fast Fire

CRASH fire fighting trucks, like General Forrest's celebrated cavalry, must "git thar fustest with the mostest." And in their design of new apparatus, Air Force experimenters will sacrifice durability and plan a truck with a life-expectancy of only five or ten years. Just so it is fast. In order to carry a large amount of extinguishing agent, they will even compromise factors of safety.

Current specifications by the Air Force require apparatus to have a top speed of at least 65 mph. The vehicle must cover a mile in less than 90 sec from a standing start.

The amount of agent that the vehicle carries must not be reduced to cut down weight. It must be held to a minimum by other methods. The modern version of the Class 155 truck has its entire body, chassis rails, bumper, etc., made of aluminum. The truck even carries aluminum ladders.

Fire fighting is today undergoing rapid changes. Not only are techniques changing, but the combustibles themselves are altering rapidly. At the end of World War II, an airport fire department was challenged by only one hazard—burning gasoline. Today this is complicated by different kinds of jet fuel, rocket propellants, and liquid oxygen. It has been said that when a present-day aircraft ignites, it isn't so much a fire as it is a slow-burning explosion.

Fuel changes are still taking place, and there is a strong belief in Air Force circles that any piece of apparatus that might be designed tomorrow would be hopelessly out-dated seven years from now. As a result, airport fire chiefs are beginning to demonstrate a disregard for qualities of safety and long service. The flight-line fire fighters want just speed and abrupt quenching power.

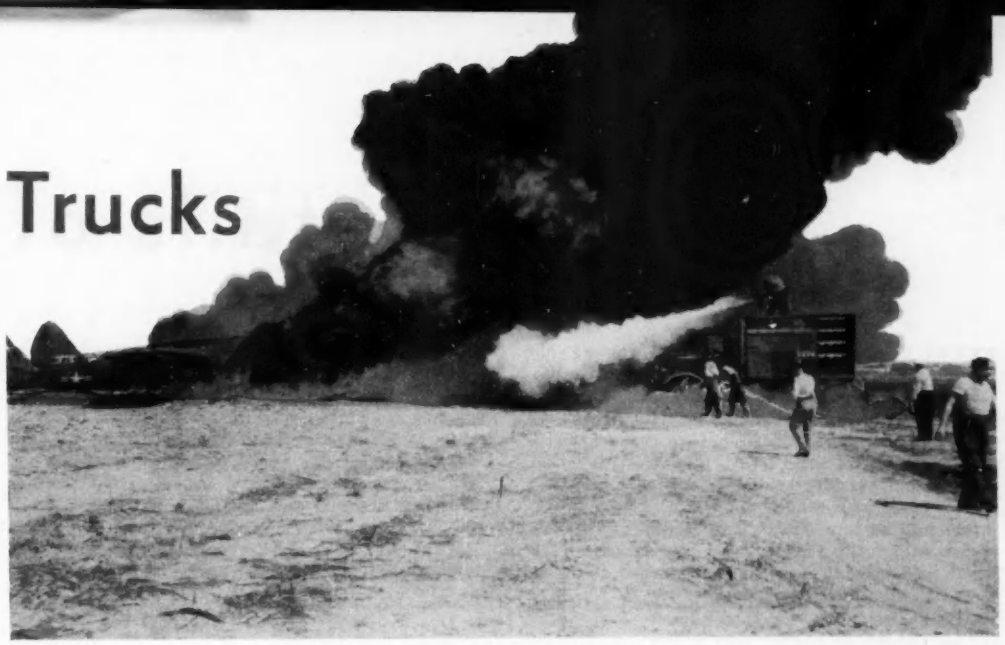
There are two accepted principles of fighting the aircraft fire. The first is that, from the moment flame breaks out, virtually no consideration is given to saving the aircraft itself. Once afire, it is assumed to be a total loss and if part is ultimately saved, that is just so much material for the salvage yard. The firemen's only object is to save the lives of the crew, Nine times out of ten, this means going in after them as the crewmen seldom are able to leave the ship under their own power after the impact of the crash. If members of the rescue squad can blast their way into the hull and remove the airmen, their job is finished. The plane can burn itself out.

The second major principle developed in fighting crash fires is this

(Above) U. S. Air Force's Type 0-8 crash fire truck. This is the first all-weather truck which can operate at —65F.

(Right) Experimental Cardox truck, Type 0-6. Rods leading into each hub cap are part of the inflation-deflation device designed to change the flotation characteristic while in motion.

Trucks



that the initial attack and knockdown must be made with every bit of force that can be mustered. The full weight of quenching agent, the full power of personnel and apparatus must be directed toward overwhelming the fire in a single, brief, all-out effort.

In some of the test blazes conducted for the Air Materiel Command, the apparatus would run out of agent some two or three minutes after starting the attack because of the volume with which that agent was applied. By that time fire-fighters were likely to be ankle-deep in a 200-ft puddle of gasoline and the hot metal of the engines posed a serious threat of flash-backs. If the fire was not completely and thoroughly out by that time, there was no alternative to a hasty retreat. Any airmen still inside the ship would have to be abandoned.

In November of 1946 General Spaatz, then chief of the Air Forces, ordered a more intensive exploration of the capabilities of existing fire-fighting equipment. Spaatz set forth two basic demands for all present and future apparatus: 1) It must be effective under the worst possible conditions with a large spillage of gasoline, adverse position of aircraft, etc. 2) It must be suited to all conditions of weather and wind.

Tests at the Air Proving Ground disclosed a number of weaknesses in trucks that had seen service during World War II. These were trucks of the Class 155. Under simulated arctic conditions some of the equipment was virtually useless. Nozzles for CO_2 were too heavy and turrets were not located in the best position.

With their tests complete, researchers began assembling the performance data on these World War II models. At the same time they compiled certain other miscellaneous information that had resulted from the controlled tests.

They discovered that a gasoline and oil fire could create temperatures of 1000 to 1200 F inside the closed pilot's campartment within thirty seconds; that temperatures in the mid-section over the fuel-bearing wings will climb to 1700 F; that it was not uncommon to record 2250 F in those parts of the plane toward which the flame is blowing.

Cooling the plane became a major problem. Experimenters admitted that, "Water fog is the best cooling agent now used. But," they cautioned, "its extinguishing ability on gasoline is extremely poor."

They found that fog-foam is superior to water-fog when used along with CO_2, for it acted to cool and smother the fire at the same time. But they also found that foam hampered the work of the rescue crews. It coated the fire-resistant hood and made vision almost impossible. They were especially pleased by the performance of the Model PP85HP Pyrere foam gun with its 105-ft range at 400 psi pressure.

Another of the miscellaneous observations resulted in a decision to improve the flotation characteristics of future trucks. The Class 155, for example, weighed 90 lb per sq in. Under adverse ground conditions—marsh or loose soil and sand—the truck would bog down.

The data on the test fires was then turned over to the Air Materiel Command and they began to design new apparatus which would be specifically adapted to

(*Turn to page* 102, *please*)

Design Details of

Two Caterpillar industrial Diesel engines, the D337 and the D326, which are going into production, have several new features. The six-cylinder D337 engine is an industrial version of the 5⅛ in. by 6 in. engine developed as a power source for the DW20 and the DW21 tractors. The D326, although quite similar in design, will be offered with a lower horsepower range.

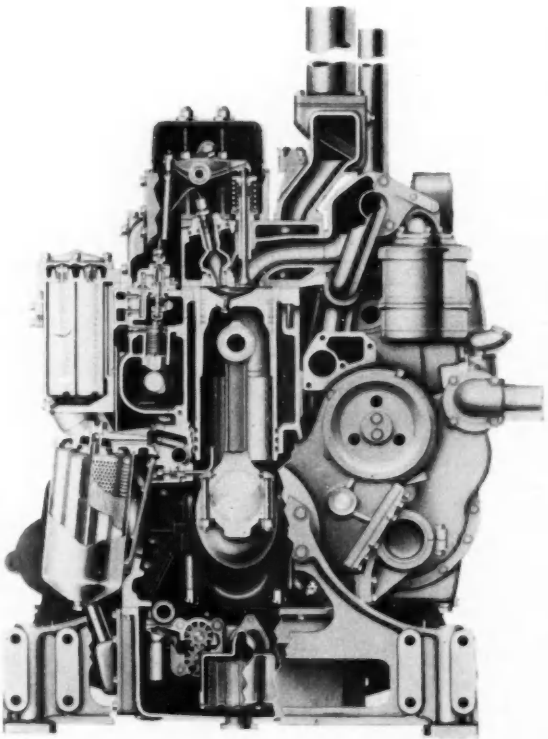
One new feature on the two models is the fuel system with fuel pumps mounted adjacent to the cylinders they serve. This results in standard, identical, short fuel lines for each cylinder.

Oil cooled pistons have long been standard on Caterpillar engines, but a new arrangement is used on the D337 and D326. The pistons, which have an iron band cast integrally for the upper ring, are cooled by an oil stream sprayed from a nozzle that is solidly attached to the engine block. Since this spray lubricates the piston pin, as well as cooling the piston, oil grooves are not required in the connecting rod.

A completely redesigned 25 hp vertical gasoline starting engine is used with the D337 and D326 engines. This starting engine has several new design features to provide easier starting, regardless of weather conditions. These include crank throws located adjacent to each other to give an even firing design, an up-draft carburetor to provide easier hot starting, as well as excellent cold starting, and a wet type clutch to provide longer life with less adjustment.

On the opposite page is shown a front cutaway view of the D337 engine. Note arrangement of one of the fuel pumps mounted opposite the cylinder that it supplies.

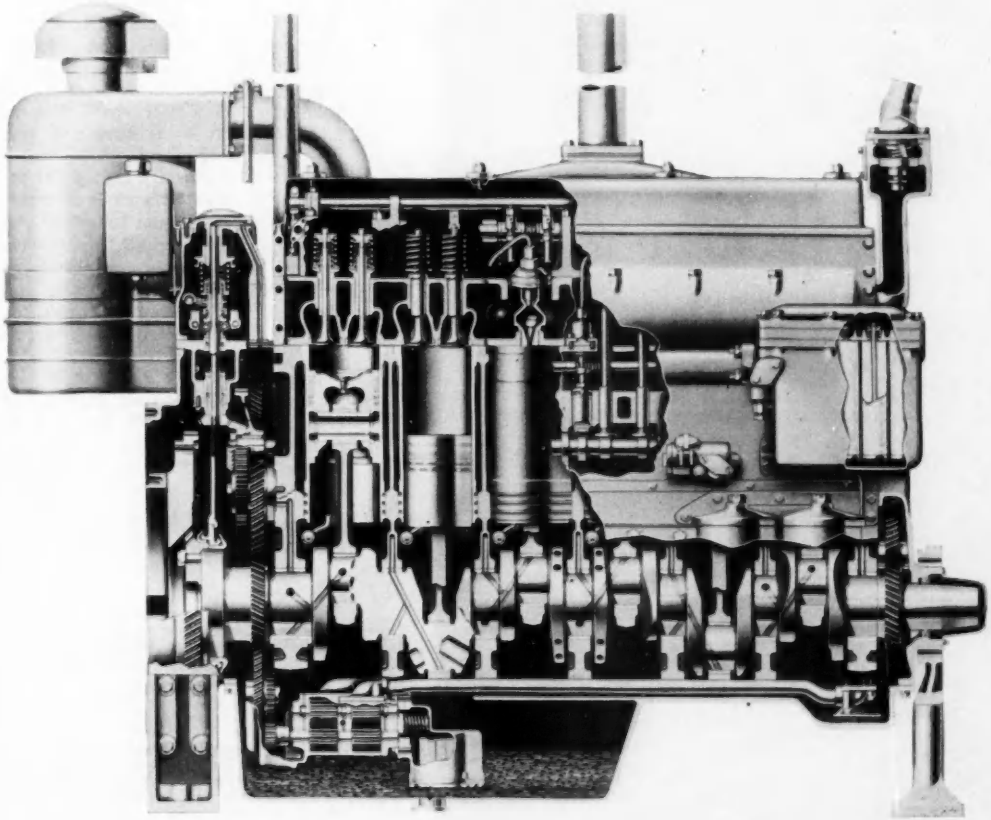
On this page is a longitudinal cutaway view showing details of the principal units and oiling system of the D337 engine.



Two New Diesels

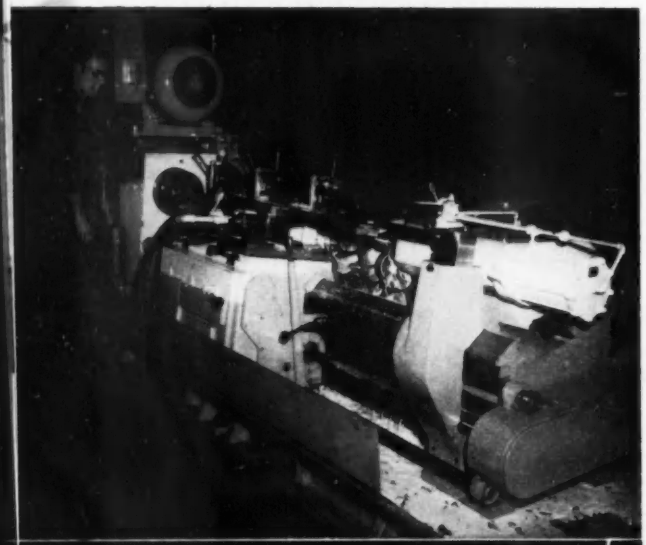
Horsepower Ratings for the New Engines, Without Fans

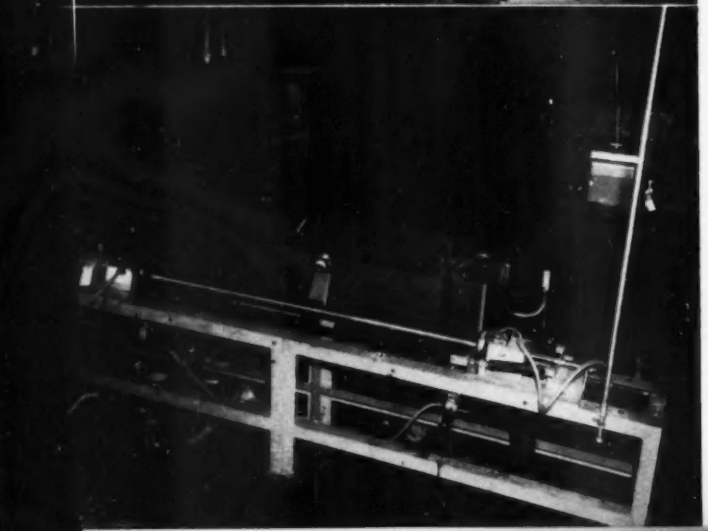
	D337	D326
Peak	275 hp @ 2000 rpm	186 hp @ 2000 rpm
Intermittent	250 hp @ 2000 rpm	171 hp @ 2000 rpm
Rated	180 hp @ 1600 rpm	125 hp @ 1600 rpm
Continuous	170 hp @ 1600 rpm	118 hp @ 1600 rpm



This is the Walker Bull-Dog tank built in the Cadillac Tank Plant.

How to





THIS is the story of the epic efforts put forth for the production of the Walker Bull-Dog tank, the first of which was delivered to Ordnance three months ahead of schedule by the Cleveland Tank Plant, Cadillac Motor Car Div., General Motors Corp. The background of this event—literally the birth of an enormous manufacturing operation—now being skillfully expanded within a floor space of some 2,588,893 sq ft — is something that dwarfs the imagination. To the writer it is the most effective example of industrial "bigness" at work in an emergency, with exceptional know-how and drive, capable personnel, nation-wide contacts with sources for machinery and materials and sub-contracting, and above all the financial resources for carrying on a program of such magnitude.

It all started with a nucleus of just 50 key men selected from the Cadillac organization in Detroit and a bare plant, bare only after the thousands of bags of beans and the Air Force barracks had been removed. Literally,

(Above) Close-up of one of the two long bed LoSwing axle shaft automatic lathes set up for turning the long torsion bars.

(Left) Torsion bars are hardened for their full length in this Cheston resistance heating machine. The upset ends for serrations are enclosed in induction coils at the ends to assure full hardening.

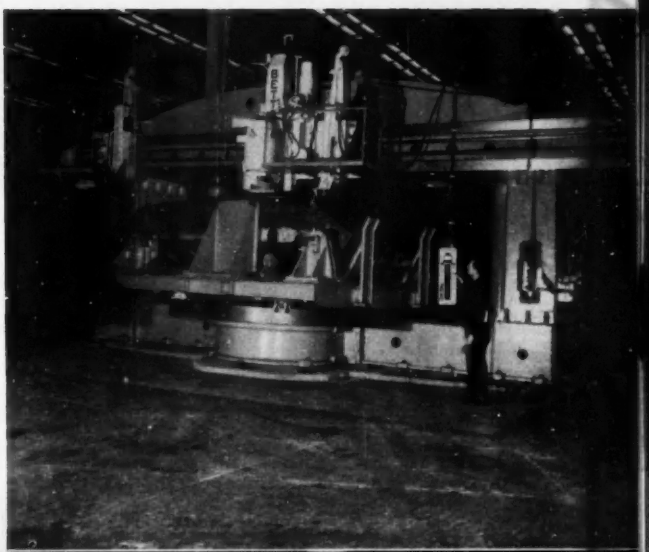
By Joseph Geschelin

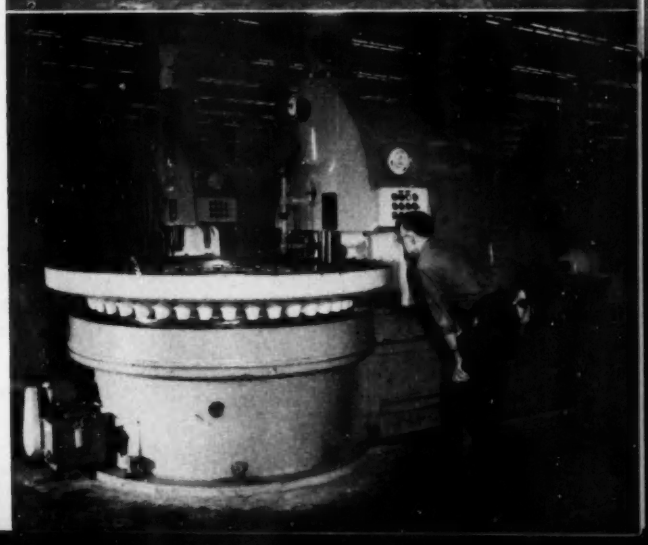
Cadillac is Equipping Plant Build Walker Bull-Dog Tanks

almost overnight it has expanded into an organization of 4000 employes—toolmakers, engineers, draftsmen, model shop mechanics, etc. Additional workers are being recruited by various means, including a special TV program, with an ultimate goal of some 10,000 workers.

Not the least of the management problems from the start has been the training of these people in Cadillac methods, in working with precision machinery as well as some of the largest machines used in the metalworking field. In addition, it is necessary to train and qualify welders capable of handling the exacting job of welding armor plate.

Procurement of thousands of items of machine tools, many of them of outsize similar to machinery used in large erection shops and on the railroads, posed a problem of major proportions, particularly in view of the mounting backlog of orders on the books of machine tool producers. The selection of much of this equipment was made early in the program and fortunately before





(Above) Here is the 24-ft Betts vertical boring mill, product of Consolidated Machine & Tool Co., used for machining the turret opening in the complete tank hull. Time required to make this machine available, as well as a major cost saving, were achieved by improvisation—utilizing a 12-ft mill and extending side columns to give the required clearance.

(Right) The big internal bull ring—73½-in. PD, with 294 teeth—is cut in the battery of special out-sized Fellows gear shapers shown here.

Condensed Routing of Torsion Bar

	Operation	Equipment
1.	Straighten bar	Colonial straightening press
2.	Mill ends to length and center both ends	No. 1-484 Sundstrand mill and centering machine
3.	Grind two spots	10" x 96" Cinn. plain cyl. grinder
4.	Grind center spot	10" x 96" Cinn. plain cyl. grinder
5.	Turn one end (using two ground spots)	Lo-Swing automatic lathe—7" x 80"
6.	Turn opposite end (using centers and one ground spot)	Lo-Swing automatic lathe—7" x 80"
7.	Grind serration diameter both ends	10" x 96" Cinn. plain cyl. grinder
8.	Grind center portion of shaft	No. 2 Cincinnati centerless grinder
9.	Grind two blending radii	No. 2 Cincinnati centerless grinder
10.	Tap hole in ends	Special Avey horizontal tapping machine
11.	Stamp clockwise arrow	Special fixture
12.	Heat	Cheston electric heater
13.	Quench	Gogan quenching machine
14.	Draw	Lindberg furnace
15.	Straighten (hot)	Colonial hydraulic straightening press
16.	Magnaflux inspection	Magnaflux
17.	Shot peen all over	American Wheelabrator
18.	Hob serrations —42 one end; 44 other end	Barber-Colman hobbers (16" x 36")
19.	Preset (twist for permanent set)	Gogan torsion machine
20.	Mill out tooth, each end, for location	No. 4 x 36" Cincinnati hydramatic mill
21.	Degrease	
22.	Mask ends and paint	

How Cadillac is

the gathering military program had gained momentum. Orders were placed with major machine tool builders, a follow-up procedure and card records set up, and expediters housed at each of the major centers such as Rockford, Cincinnati, New England, and around Cleveland. Expediters make weekly contacts on each order, transmit the status of orders to the Tank Plant for posting and action.

Meanwhile, other teams and the plant manager were touring Government warehouses—Janmat pool machinery—earmarking desirable items. This was supplemented by purchasing an enormous dollar volume of used machinery, the latter being rebuilt and reconditioned in a special machine tool department in the plant. This operation is self-sufficient, making replacement parts, rebuilding and scraping ways, replacing gears and lead screws, if need be.

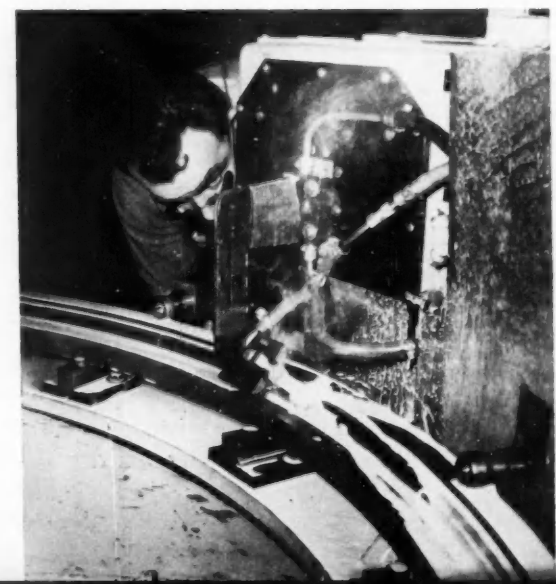
All machine tool equipment set up in the plant is repainted in accordance with the well-known DuPont dynamic color scheme.

During the developing process of acquiring and setting up machine tools, management has placed the responsibility for establishing production in the hands of the superintendent of each department. He is provided with a floor plan of his department with all equipment spotted in place, with a key indicating the status of delivery. Where delivery time is too long, the superintendent must seek improvisations after consultation with the plant manager, leading to the use of a used machine or in some cases — where feasible — farming out the work to a sub-contractor.

In any event, all substitutions for new equipment require a restudy of fixtures and tooling, followed by the design and fabrication of such items to suit the substitute machine. Too, in instances of substitutions the original order for a new machine with long delivery is cancelled out.

Keynote of this rapidly developing operation is a partnership of engineering and manufacturing coupled with excellent cooperation from the Ordnance Department in seeking design modifications that will simplify manufacturing methods and effect cost economy.

An important adjunct to such studies is found in the establishment of a Process Development Section whose function is to study manufacturing procedures and develop the best way of handling each major prob-



Temporary setup on the unique Tocco induction hardening machine for hardening the ball raceway of the three turret ring sections. The ring is hardened as it is carried through the induction hardening head while on the rotary table. The permanent setup will have an enclosed Tocco head.

Equipping Plant to Build Walker Bull-Dog Tanks

lem. Another special research group is working simultaneously on packaging procedures and standards for spare parts packaging for overseas shipments.

Extensive test and research facilities are being completed. This includes two big dynamometer rooms with sufficient space and equipment for handling a complete tank, a dynamometer room for engine testing, and a special test department for various kinds of accessories. In addition, there are complete laboratory facilities for wet chemistry, metallography, and physical testing.

Exacting military requirements demand sampling X-Ray inspection of armor plate welds, castings, forgings, and other specific elements. For this purpose the plant has two X-Ray departments—one equipped with a 250,000-volt machine; the other with a 1-million-volt unit.

The plant has a floor space of 2,588,893 sq ft, and occupies a land area of 411 acres. Power requirements, due to heavy machine loads and extensive welding operations—there will be around 1200 arc welding sets in use—are enormous, and demand a power supply of 30,000 kva. From the standpoint of the public it is of interest that Cadillac has made an investment of $250,000 in a waste disposal plant designed to handle cutting oils and other wastes, effectively preventing such materials from entering public streams and rivers.

Because of the nature of this operation and the need for handling large and bulky heavy parts, materials handling has been organized with the use of industrial trucks for transporting parts and assemblies, large craneways for moving parts in and out of machines and the huge Ransome welding positioners. Smaller parts are palletized to simplify handling and storing. Because so many parts and subassemblies are large and heavy, Cadillac has introduced an innovation in their receiving and distribution. The entire working area is honeycombed by 20-ft aisles, permitting highway trucks and trailers to enter the building and deliver their loads directly to the point of usage.

Manufacturing equipment marks a mixture of conventional or at least familiar precision machines and automatic machines such as lathes, grinders, automatic screw machines, etc., and enormous machinery in the form of radial drills; 100-in., 14-ft and 24-ft Betts mills; planers, and large multiple-spindle Baush drills.

Of special interest is the fact that grinders and precision machines of various kinds are mounted flexibly on the floor on specially designed spring-suspended mounts. This permits accurate alignment

(*Turn to page* 92, *please*)

(Above) The armor plate turret is welded integrally in this big Ransome welding positioner.

(Right) Torsion bars have the center section ground in Cincinnati Centerless grinders, the work being hand fed to clear the upset ends. This operation speeds grinding materially compared with the initial practice of conventional external grinding.

Table 1—Cadillac Test Car Data

	1915	1935	1951	19XX
Bore	3 1/8	3 3/8	3 13/16	3 3/4
Stroke	5 1/8	4 15/16	3 5/8	3 1/4
Displacement	314	353	331	287
Compression Ratio	4.25	6.25	7.50	12
Brake Specific Fuel	...	0.63	0.55	0.46
Max Brake Torque	152	234	268	266
Max bmep	73	100	122	140
Max bhp	77 @ 2600	*108 @ 3000	*133 @ 3600	*148 @ 4000
Hp/cu in	0.245	0.306	0.402	0.522
Wheelbase	122	128	126	126
Curb Weight	4140	5050	4440	4440
Eng rpm/mph	46.5	51.4	40.2	32.9
Axle Ratio	5.07	4.6	3.36	2.75

* As installed horsepower, GM test code corrections and procedures.

A NEW experimental 12 to 1 compression ratio V-8 automobile engine has recently been developed and tested by the General Motors Research Laboratories for the future planning of more efficient engines and higher octane fuels. The 19XX, as the engine is known, was installed, together with an improved Hydra-Matic transmission, in a 1951 Cadillac. In order to obtain test data, three other Cadillacs—1915, 1935, and 1951—representing various stages of engineering development were run under comparable test conditions with the experimental 19XX. Table 1 shows specification data on these cars.

Test information was obtained last winter during February and March at the GM Phoenix, Ariz., Laboratory. Cars were run under GM present standard test procedures using modern instrumentation so that results are directly comparable. Special fuels were provided so that performance and economy data would reflect the results to be expected in the year the car was produced. This, it is believed, is the first time anyone has run a series of tests on old and new cars using modern instruments and test procedures.

The displacement of the 19XX engine was chosen for these comparative tests to give about the same

GM's

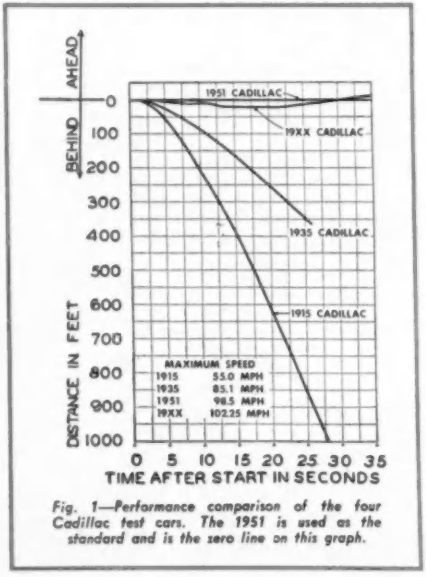


Fig. 1—Performance comparison of the four Cadillac test cars. The 1951 is used as the standard and is the zero line on this graph.

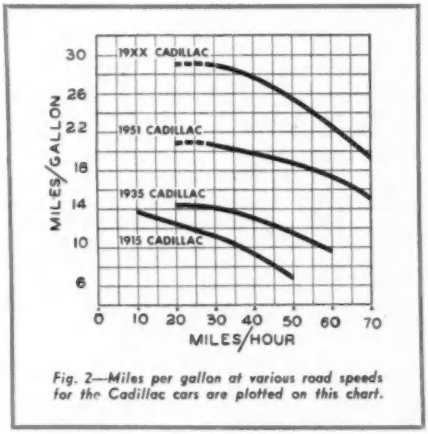


Fig. 2—Miles per gallon at various road speeds for the Cadillac cars are plotted on this chart.

horsepower characteristics, and hence the same road performance as is obtained on the 1951 Cadillac. Thus in the 19XX car, the experimental high compression engine demonstrates clearly the fuel economies which are possible with the new power plant-transmission combination.

While present performance characteristics are ade-

Mr. McCuen is shown here giving a "dry run" presentation of his task force's job on the 19XX engine before the GM Technical Committee, which includes chief engineers of various GM divisions, who may use data in any of their own future programs.

By C. L. McCuen

General Manager, Research Laboratories Div., General Motors Corp.

19XX HC Engine

quate from the standpoint of existing traffic conditions and available roads, the possibilities of modifying this design to provide greatly increased horsepower with substantial savings in fuel economy over existing engines are virtually unlimited.

A comparison of performance data taken on the four Cadillacs is given in Fig. 1. As shown, the maximum speed has been increased in each succeeding model. While increased maximum speed was not an objective in the 12 to 1 special, it was obtained auto-

(*Turn to page 80, please*)

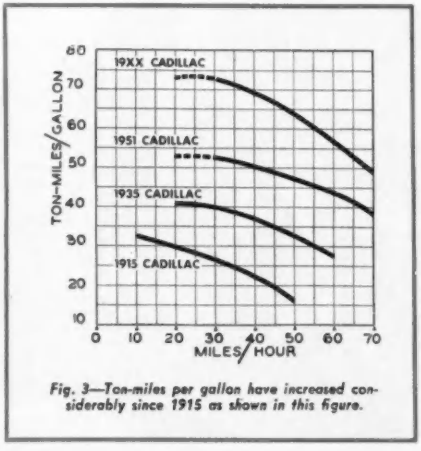


Fig. 3—Ton-miles per gallon have increased considerably since 1915 as shown in this figure.

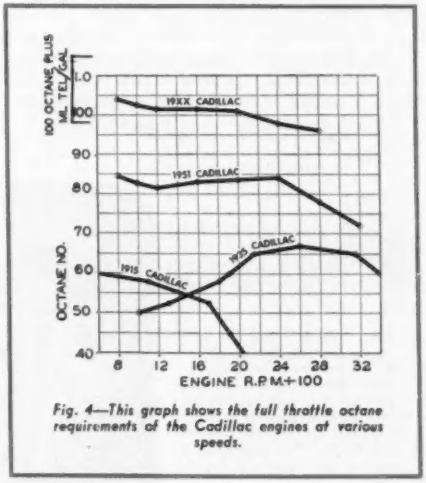


Fig. 4—This graph shows the full throttle octane requirements of the Cadillac engines at various speeds.

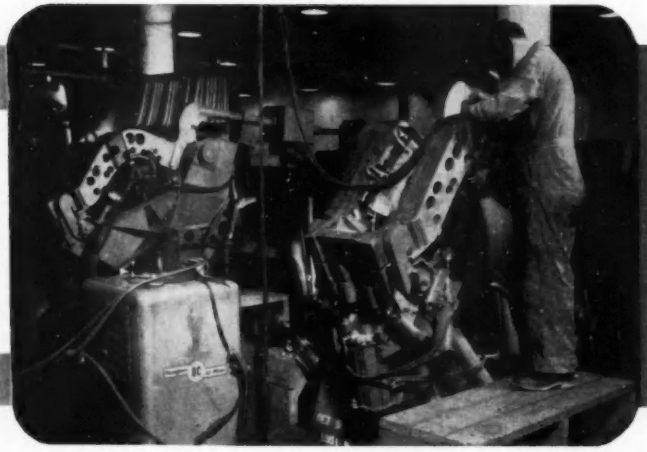
This massive fixture was recently placed in operation at the Lansing Fisher Body plant for producing the new Oldsmobile Super 88 balloon section. Seen in this view is the gas-welding of the rear compartment panel front seam.

Simplified Body Design Reduces Soldered Joints

INCIDENT to the introduction of the 1951 Oldsmobile Super Deluxe 88, the Lansing Fisher Body plant is now in production on a new line of Fisher bodies featuring many advanced design principles. These body models have the rear fender stamped integrally with the rear quarter panel, thus reducing the number of parts and operations usually associated with more conventional body structures. Similarly the design of the cowl has been simplified, reducing the number of parts. However, it is made stronger, more rigid and more durable than ever.

Because of the cost of labor and materials associated with soldered joints, the new body has been so designed as to reduce solder to the very minimum, actually down to but a few inches of joints requiring soldering. Major reduction has been effected at the cowl, the junction of quarter panel and roof panel, and

(*Turn to page* 100, *please*)



New welding fixture for preparing the rear fender section is in two separate units for rights and lefts. The inert-gas shielded arc welding machine seen here is used for welding the joint at the rear nose of the fender. The operator is working on a gas weld in this view.

METALS

Sharp Advance in Metal Prices Abroad; With Reduction in Import Duty, More Copper and Lead Will Be Imported

By William F. Boericke

No Rollback in Metal Prices

Uncertainty is the keynote today in metal prices. Whether OPS can hold the ceiling prices established for copper, lead and zinc unchanged or will adopt a more realistic attitude because of higher world markets, is debatable. Only one thing is certain—there will be no rollback. Primary metals and scrap are exempted from the regulation establishing general ceiling prices for certain manufactured products based on highest prices charged between April 1 and June 24, 1950.

Ceiling prices of copper, lead and zinc are still officially held at 24½ cents, 17 cents and 17½ cents per lb, respectively; levels that were established more than six months ago. In the interim, metal prices abroad have advanced sharply. In the United Kingdom, prices have been raised to 26¼ cents per lb for copper, 20 cents for lead and zinc, to permit British users to get a supply of metal in competition with Continental buyers. Fancy prices as high as 50 cents per lb for copper and 35 cents for zinc have been quoted in Europe.

It appears incongruous and illogical that the United States, largest consumer of the metals in the world, with a supply inconveniently short to satisfy military and civilian needs, should stubbornly adhere to a price schedule so unrealistic with world demand and supply.

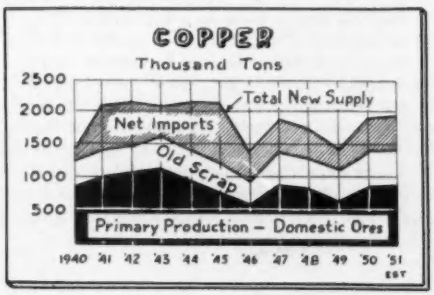
This was grudgingly admitted at long last by Washington when it was agreed to raise the price of Chilean copper sold in the United States after May 8 by three cents, thus establishing a price of 27½ cents per lb. This has been under negotiation for many weeks and ended with victory for the Chilean government. On its part, Chile agreed to use every effort to increase copper production without financial assistance from Washington and, at the same time, to limit its copper exports to 20 per cent to countries other than the United States. As a somewhat superfluous rider, Chile will not offer its copper elsewhere at a lower price than to the United States.

More Copper from Chile

In 1950 Chile produced 381,400 tons of copper of which 291,300 tons were exported to the U. S. Peak production during the war was 550,000 tons, and it appears likely that under the new agreement, a sharp increase over 1950 may be witnessed. This will be welcome news to copper users in this country, and especially gratifying to the copper fabricators. However, any increase will be gradual and will not affect the current tight condition of supply until later in the year.

While the higher copper price applied only to Chilean producers, it is certain that other important foreign suppliers, notably Canada, Mexico and Peru, will be vociferous in demanding equal treatment with Chile. Unless this relief is granted, foreign producers will look for markets in Europe. In fact, this was admitted by an official of Cerro de Pasco who declared that a substantial portion of the output of this important American-owned company had been sold abroad at higher prices.

The disturbing question immediately arises as to who will pay the three-cent increase to Chile. Either Washington must subsidize the Chilean mines in order to maintain the present domestic ceiling price or it must allow the domestic market to advance to the same level. That would mean a crack in the rigid price policy of OPS that could easily extend over into lead and zinc, and other commodities as well.



Suspension of Tariff on Copper

Final passage by Congress of suspension of the two-cent tariff on imports of foreign copper will alleviate to some extent the effect of the higher price to Chile. For some time we have had two prices for copper in this country, 24½ cents for domestic and 26½ cents for foreign, with the duty absorbed by the buyer. Thus the foreign seller was able to obtain the domestic price although the buyer paid two cents more for the metal.

(*Turn to page 84, please*)

Automatic Clutch Control

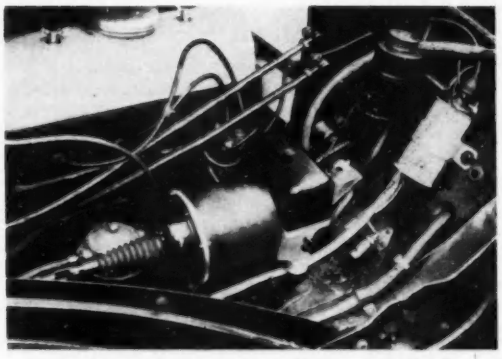
Introduced in France

By W. F. Bradley
Special European Correspondent for
AUTOMOTIVE INDUSTRIES

PARIS, FRANCE

THE Lavalette Co. of Paris, one of the largest French manufacturers of electric equipment and Diesel injection appliances, is tooling up for production of the Bochory automatic clutch control and expects to make first deliveries in June.

Designed by Michael Bochory, this device renders the clutch pedal unnecessary, all gear changes being made by manipulation of the speed change lever and accelerator pedal. There is no change in the clutch itself, whatever the type. Designed for any particular type of car, the Bochory can be fitted in a few hours, without structural alterations. If it is desired to cut out its operation, this can be done by turning a special ignition key, when operation of the car becomes normal with manual clutch pedal and hand operated gearshift. The intention of the Lavalette Co. is to put the device on the market as equipment to be handled by repair men and service stations, the price probably being in the neighborhood of $45. In addition, negotiations are pending for its adoption as standard on some of the popular European cars.



Automatic clutch control fitted to front-wheel drive Citroen.

Bochory makes use of the vacuum in the intake manifold, together with two solenoid valves, to effect clutch operation. The piston in the vacuum cylinder is connected to the clutch lever either by rod or cable. Movement of the piston is controlled by the speed change lever and by the accelerator pedal. These are connected to electric contacts, which regulate the opening and the closing of electric valves; one in the vacuum line and the other on the body of the pump. On moving the speed change lever the vacuum valve is opened and the cylinder is closed, this causing a depression which releases the clutch. On depressing the accelerator pedal, the reverse movement takes place; atmospheric pressure is admitted to the

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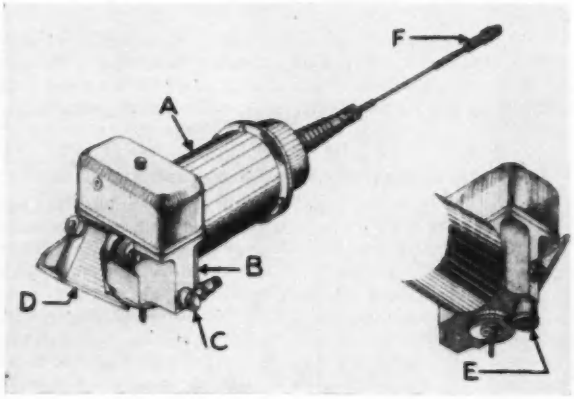


Bochory automatic clutch control. A—Vacuum cylinder. B—Housing for two solenoid valves. C—Connection to intake manifold. D—Support bracket. E—Filter for air intake. F—Cable to clutch lever.

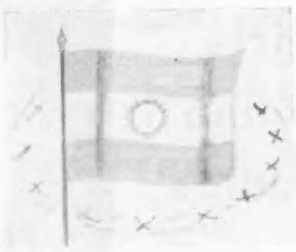
Argentina to Develop Own Aircraft Industry

By David J. Wilson

BUENOS AIRES—Argentina plans to produce military and civilian aircraft, including jet planes, in sufficient number to satisfy all her demands "in a reasonable future," according to President Juan Peron. In a message to Congress last month, Peron said:

"The government, surmounting the limitations imposed by the scarcity of raw materials, and the Ministry of Aeronautics, with the formation of skilled personnel, have laid the basis for the crystallization in a not-distant future of the Nation's aeronautical industry."

The President added that a law passed last year called for the construction of an aircraft factory "and consequently, the country will have civilian, commercial and military aircraft designed and built by the exclusive work of Argentines." This factory, it is learned, will be built in Cordoba, near the military airbase and Technical Air Institute where German-born designer Kurt Tank last year designed and built a test jet-plane—Pulqui II—capable of doing 654 mph.



Argentine experiments with jet - propelled aircraft began shortly after World War II when six planes were purchased from Great Britain and completely dismantled here for investigation and study. A Rolls Royce Nene 2 engine from one of those planes was used in the Pulqui II, and other equipment was purchased in the United States, Western Germany and Great Britain. The all-metal airframe was hand-made under primitive conditions, in Argentina.

Close to 20 Luftwaffe pilots and aeronautical experts, and many Anglo-Argentines who served with the Royal Air Force during World War II, aided in the experiments. United States air expert Major Alexander de Seversky made two trips to Argentina, at the invitation of the Peron government.

Outcome of the experiments was the Pulqui—Araucano Indian name for "arrow"—which was later improved, resulting in the Pulqui II. Flight tests at the technical air institute in June last year revealed that the Pulqui II speed placed it in the same class as the United States F-86-A Sabre.

The test flights were repeated again in February this year, in a Buenos Aires ceremony presided by President Peron at which he said the Pulqui II would be in mass production by 1958. The plane is described as a heavy-armored interceptor with short swept-back wings. It was the first all-metal plane constructed in Argentina. Fifty-two year old Kurt Tank, formerly of the German Focke-Wulf plant and designer of the famed FW-190, was the head of the group of technicians who built the Pulqui II.

Two other all - Argentine prototype planes were developed in Cordoba, both based on plans of the famed British Mosquito, purchased from the British government after the war. One, the all-wood airframe Calquin — named after an eagle — already is in mass production at Cordoba, with a complete 25-plane squadron in service. The other, the metal-nosed Ñancú—also named after a Patagonian eagle—remains in the experimental stage. It was on display at an aeronautical fair held recently in Great Britain.

German technicians are having an important role in the birth of the Argentine aeronautical industry. The most famous, Hand-Ulrich Rudel, carried out 2530 missions against the Allies during the war, shooting down 82 aircraft. Other famed Nazi airmen include the Luftwaffe's top combat tactician, General Adolf Galland; Colonel Werner Baumbach, former head of the Luftwaffe Bomber Command; Walter Halton,

designer of the World's first tailless spotting plane; and others. According to quarters close to the government, the German technicians are being used as instructors rather than actual executives in Argentina's embryonic aircraft industry.

President Peron hopes to have sufficient Argentine experts in all phases of plane construction by the time the new plant goes into operation. It is believed that this aircraft factory will be one of the main projects of the second Five-Year Industrial Plan now being drafted under the guidance of Minister of Technical Affairs Raul Mende with the collaboration of the Ministers of National Defense, Army, Air Force, Navy and others.

Starting next year, the plan will bear fruit by 1957 or 1958, which are the dates set by President Peron for mass production of civilian and military aircraft in Argentina. The plan also calls for the construction of aluminum plants and factories for the manufacture of aircraft instruments.

New Process for Production of Tetraethyl Lead

A NEW continuous process for the manufacture of tetraethyl lead has been developed by Du Pont research men and engineers in time to bolster United States defense needs. Construction has been started on the first new continuous production unit, which will have an annual production capacity of about 50 million lb of tetraethyl lead a year. This expansion of tetraethyl lead facilities will substantially increase Du Pont's ability to meet the heavy demand for high octane fuel.

At the present time, tetraethyl lead is made in batches, a process developed by Du Pont as early as 1923. In addition to increasing productive output, the new continuous process eliminates the need for equipment made of special steel alloys which are essential in the batch process.

The new process is the result of advanced engineering design, and a major change in the basic chemical process. Greater productive efficiency will be gained from this new development and in time it is expected to entirely supplant the batch process.

The continuous process tetraethyl lead plant will be located at the Du Pont Company's Chambers Works at Deepwater Point, N. J. It is expected to be in production by January, 1952.

Sodium to supply the needs of this expanded tetraethyl lead production will be furnished in part by the adoption of a new process now being installed at Memphis, Tenn., for production of sodium cyanide from hydrogen cyanide and caustic. Sodium cyanide is currently being produced by a process requiring metallic sodium. Upon completion of the Memphis plant by January 1, 1952, this sodium will be available for tetraethyl lead production.

Electronic Particle Counter for Engine Combustion Studies

IN a continuing effort toward improving fuels, engines and lubricants, the Ethyl Corp. Laboratories in Detroit have assembled a new scientific instrument to aid current combustion research studies. This equipment detects and records the presence of solid particles in exhaust gas as small as 0.002 or 0.003 in. diam.

At present the counter is employed for studying engine scavenging processes to establish relationships between chemical scavenging and physical or mechanical scavenging. It will be used also in evaluating potentially useful fuel additives and in studying the effect of varying concentrations of scavenging materials.

In operation, a portion of the exhaust gas from the engine is drawn off through a small tube and a

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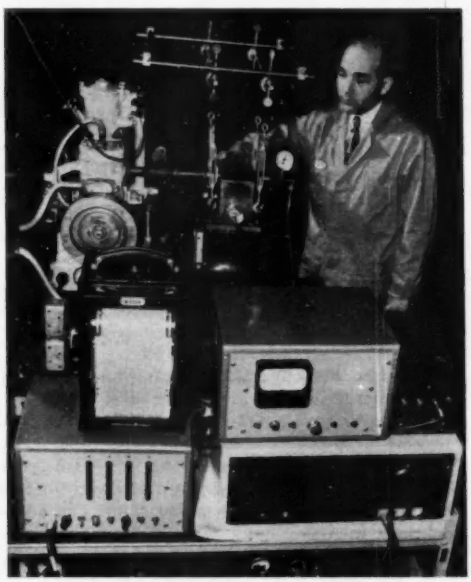
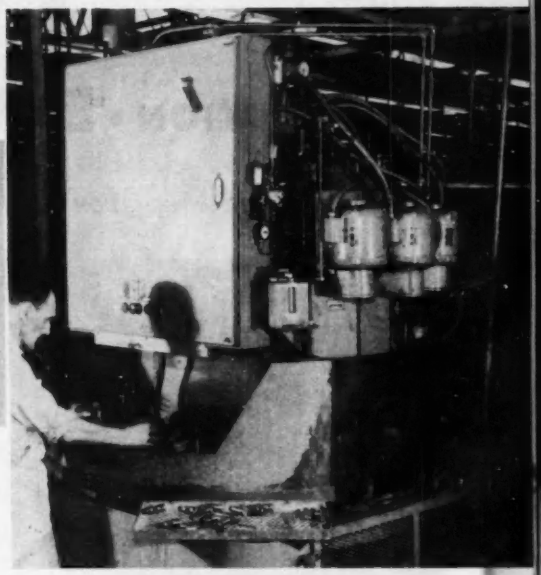


Some of the electronic particle counter parts shown here are a preamplifier (suspended from wires), continuous pen recorder (left foreground), counting rate computer (right foreground), electronic multi-scaler (lower left), and amplifier (lower right).

Special Machine Grinds and Polishes Ends of Valve Tappets



IMPROVEMENTS in production techniques, hand in hand with the adoption of advanced equipment and instrumentation for quality control, are a definite part of the continual program of modernization at the Pontiac Motor Div., General Motors Corp.

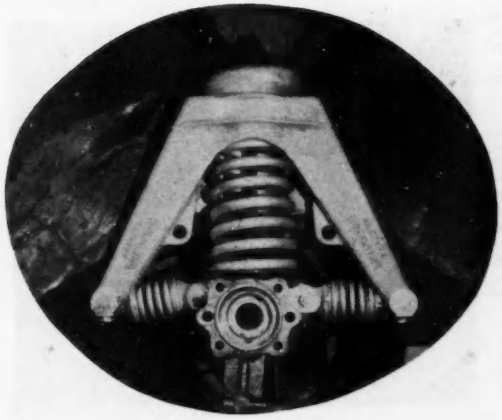
Among the many new items of machinery installed recently is a group of two Hoern & Dilts machines for grinding and polishing the foot of valve tappets. This operation is designed to finish a spherical contour to a nominal radius of 28½ in. with a surface finish ranging from three- to five--microinch. As illustrated, the machine has 12 grinding heads—six for roughing, six for finishing. The last head on the finishing group has a small wheel for polishing the surface. The operator at the leading station loads six pieces at a time.

It is of interest that the small diameter, cupped,

(*Turn to page* 100, *please*)

Variable-Rate Suspension for French Renault Car

Gregoire variable-rate suspension as now applied to rear engine Renault.



THE Gregoire variable-rate suspension is now being applied to the rear-engine Renault, France's largest selling car. This suspension is not fitted as the cars come off the assembly line, but Renault has made arrangements for its fitting as an extra, at a low cost, the time required being only three or four hours for the rear pair.

The present vertical coil spring is replaced by a lighter spring which is mounted in an inverted "V" light-alloy member. The two extremities of the inverted "V" receive the supplementary coil springs attached at the other end to the support arm.

With this suspension the oscillation period is 0.63 sec with the driver only aboard, increasing to only 0.65 sec with four persons in the car. The flexibility of the original suspension

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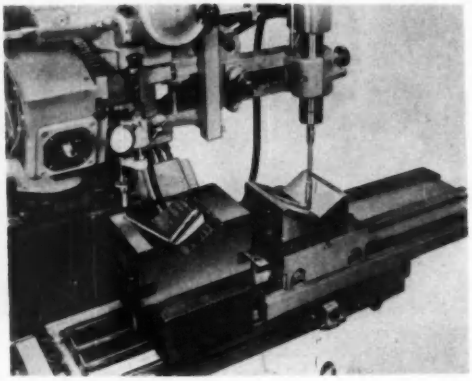


Cincinnati Milling Machine Co. reverse image attachment

B-75—Reverse Image Attachment

Announced by the Cincinnati Milling Machine Co., Cincinnati, Ohio, is a reverse image attachment for their vertical Hydro-Tel type milling machines. This attachment is employed for milling right or left-hand dies, molds, and hobs from masters of the opposite hand. Thus, with only one master, both right and left-hand matching halves of a die can be milled to perfect symmetry. Attachments are available for three Cincinnati milling machines. 8 in. by 18 in. tool and die miller; 16 in. vertical Hydro-Tel, and 28 in. vertical Hydro-Tel.

All sizes of the attachment function

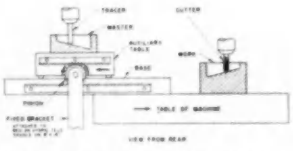


Diagram of Cincinnati reverse milling attachment

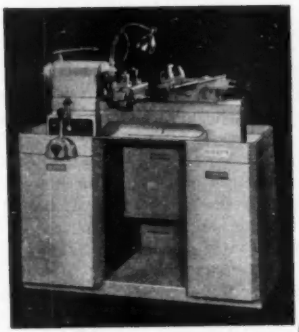
in the same manner. It is designed to be mounted on the machine table at the right-hand end, under the vertical depth control unit. It consists of a rigid supporting base which carries an auxiliary table on anti-friction rollers. At the rear of the attachment, a pair of matched racks, one on the supporting base and one on the auxiliary table, are engaged by a gear which is carried by a fixed bracket. The gear acts as an idler between the two racks, translating movement of the machine table to movement of the attachment table in the opposite direction. Therefore, a master shape mounted on the auxiliary table will be reproduced in the die block, but to the opposite "hand."

B-76—Precision Turret Lathe

For fast production of small duplicate parts to interchangeable limits, Rivett Lathe & Grinder, Inc., Boston, Mass., offers a 9 in. swing turret lathe to add power and speed to the basic accuracy of the company's cabinet lathe.

Grouped controls permit instant selection of variable cutting speeds from 90 to 3750 rpm, and an automatic chuck closer with switch, controls the spindle drive and brake. The spindle is dynamically balanced on super-precision, grease-sealed ball bearings, mounted to incur no thermal stresses.

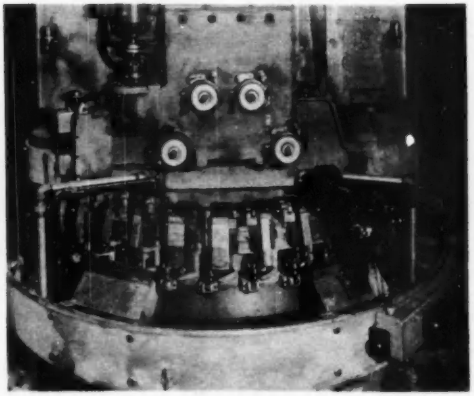
Newly designed collets have doubled



Rivett 9 in. swing turret lathe

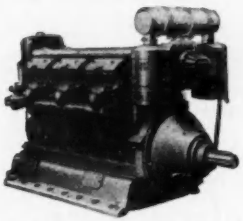
B-77—Four-Spindle Rotary Surface Grinder

Mattison Machine Works, Rockford, Ill., has just completed this specially equipped No. 72 four-spindle Mattison (Hanchett Type) rotary surface grinder for finishing the body and cover of automotive oil pumps. Work pieces are held in automatic clamping fixtures as shown in the close-up picture. A safety device stops the table in case the operator does not locate the work properly in the fixture. Automatic sizers are constantly in operation checking the work and keeping all pieces within specified tolerances, without the operator's attention

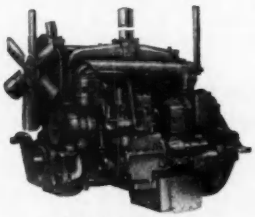


SOME *Famous* ENGINES EQUIPPED WITH SCHWITZER-CUMMINS SUPERCHARGERS

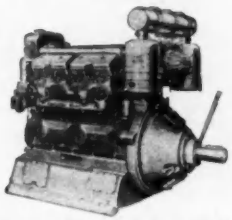
Model 687-C—Harnischfeger Corporation 6 cylinder, 2 cycle using two S-C superchargers.



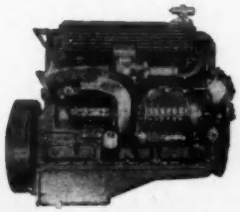
Model D-397—Caterpillar Industrial Diesel V-12.



Model D-337—6 cylinder—Caterpillar Diesel.



Model D-375—Caterpillar Diesel V8.



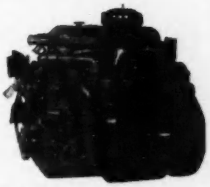
Model HRBS-400—Cummins Engine Company, Inc. (Used also on HBS Series)

More than twenty-five years of research, intensive engineering, wide field experience and unexcelled manufacturing facilities are back of our product.

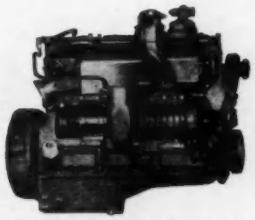
Its excellent service record in tens of thousands of applications under the most severe operating conditions has established Schwitzer-Cummins superchargers as a product of supreme reliability and efficiency.

We build superchargers for trucks, busses, earth-moving equipment, power plants, submarines, in fact for all uses up to 800 hp.

We can offer the last word in engineering assistance and the ability to produce efficiently.



Model 487-C—Harnischfeger Corporation 4 cylinder, 2 cycle.



Model NHRBS-600—Cummins Engine Company, Inc. (Used also on NHS-NHBS-NHBRS.)

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Also
Supercharges Engines
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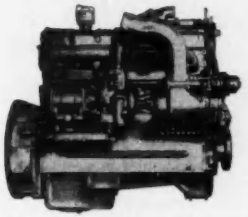

Model JBS-600—Cummins Engine Company, Inc. New High Speed Engine.

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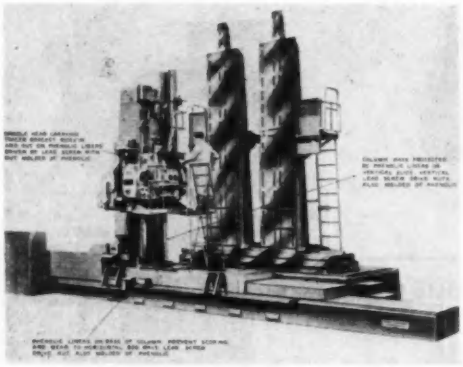
For additional information regarding any of these items, please use coupon on page 60

bearing spacing for greater precision and increased gripping power. Draw-in collet capacity is 1⅛ in, on a long taper key-drive spindle nose. Capacity of the stationary collet is ⅞ in., and closing action is accomplished without lateral movement in the spindle thus preventing scarring of the stock. A self-aligning slide rest automatically squares itself with the line of centers. Double-bevel steel ways, hardened and ground, provide positive centering action.

An automatic indexing turret revolves on a ball thrust bearing having constant preload opposed by taper roller bearing to prevent vertical error; the locating and locking index pin engages jig-ground holes on the index plate, to prevent lateral error.

B-78—Millers Having Phenolic Bearing Surfaces



Pratt & Whitney Keller type BG-22 tracer controlled milling machine, having phenolic bearing surfaces on all sliding parts

Overcoming problems of scoring and wear to bearing slides inherent in heavy duty machine tools, Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford, Conn., now incorporates phenolic bearing surfaces on all sliding parts in their huge P&W Keller type BG-22 tracer controlled milling machines. Use of phenolic liners on all slides eliminates the troublesome iron against iron bearing surfaces.

Laminated phenolic plates, sliced edgewise for end-grain surface, are fastened to the slides of the column base, vertical slide, and spindle head, the movement of which provide the horizontal, vertical and transverse motions of the machine. These plates are pinned securely to the castings with phenolic pins and the surfaces are then planed and precision scraped to their mating slides to the same limits of accuracy as were the previous cast iron bearings. The lead screws which drive these heavy members are also protected by phenolic, the nuts being molded of phenolic material, giving a positive contact fit, which is said not to pick up and freeze.

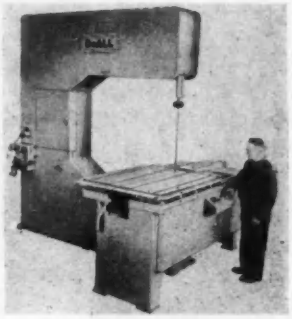
Besides the non-scoring and extremely good wearing characteristics of phenolic, it also has a heat-insulating quality important for high speed operation under heavy weight, the company points out.

The large Keller BG-22 operates at rapid traverse speeds up to 250 ipm. With complete phenolic bearing protection, continuous high speed operation is declared possible over many years of trouble-free service, without loss of accuracy .

B-79—Machine Tool Accessory Table

An accessory table, announced by the DoAll Co., Des Plaines, Ill., can be mounted to any standard DoAll machine to adapt it to easy, accurate, vertical, straight line bandsawing of exceptionally bulky or heavy work pieces such as large die blocks, castings or forgings. As used for production sawing, cut-off work, and for slicing intricate ferrous or nonferrous castings for inspection, the work piece is cut automatically with a smooth precision finish often suitable for making porosity tests.

The table shown is used on a 60 in. throat 40 in. work height capacity

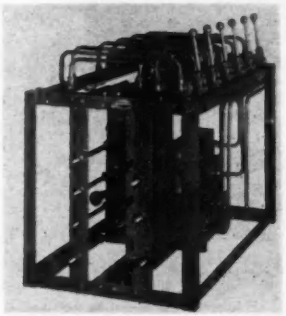


DoAll accessory table

DoAll band machine, Model V60. It has a 40 in. by 48 in. table and a carriage bed 87 in. by 36 in. which will support a load of 3000 lbs. The bed connects to the machine frame and is supported by fabricated steel legs with leveling screws. Floor space of the unit is 126 in. by 40½ in., weight 3000 lbs, and the table surface is 45¾ in. from the floor. The table has four T slots to receive work clamps, vises, etc.

The hydraulic system consists of a 5 gal reservoir with filler opening and clean-out plate and a 2 gal per min gear-type hydraulic pump, driven by a ¾ hp motor. The circuit has an adjustable relief valve to limit working pressure to approximately 200 psi. A filter is attached to the suction line of the pump. Controls, governing rate of table feed up to 18 fpm and reversing rate of 36 fpm are located on a panel mounted on the carriage bed.

B-80—Oil Measuring Dispenser



This unit, a product of J. N. Fauver Co., Inc., Detroit, Mich., measures six different predetermined amounts of oil into car transmissions, through a single hose and six valves, at a measuring rate of 75 per hr. The measuring cylinders are made oversized, and it is only necessary by simple, fast adjustment to increase the length of stroke of the piston to get greater quantity, or to decrease the length of stroke of the piston in order to cut down on the amount of oil dispensed. Only one hose is required from the storage to the reservoir

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NEW PRODUCTS

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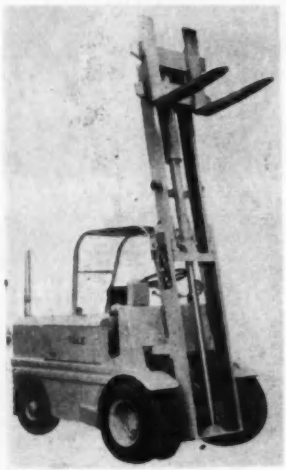
C-118—Fluid Transmission On Diesel Lift Truck

A new diesel-powered lift truck with fluid transmission, now available commercially for the first time in the U. S., is being offered by the Yale & Towne Mfg. Co., Phila. Div., Phila., Pa. Called the "Diesel-Lift," this new truck is specifically designed for applications where fire hazards exist, where there is a limited amount of fresh air, and in outdoor areas where continuous heavy-duty operation is a necessity. The truck utilizes a Hercules six cylinder diesel engine with a continuous rating of 70 hp, equipped with standard Bosh governor controls.



Yale & Towne Diesel-powered lift truck with fluid transmission

All power impulses from the engine are transmitted through a double impeller fluid coupling. There is no unyielding metal to metal driving connection. This fluid coupling, due to its hydraulic balance, eliminates chattering, stalling and stumbling, damaging starts and stops, and assures the availability of full engine power for heavy pulling and steep ramp work.

The power plant of the new Yale truck also provides large hypoid gearing of the type usually found in over-the-road highway carriers. Hydraulic brakes assure equalization of braking pressure and the smooth, even stops that prevent load shifting and damage.

The new Yale Diesel-Lift has a condenser type water muffler which screens out sparks in the exhaust gases for further safety in applications where fire hazards are involved.

The truck drives like an automobile and all controls are located within easy reach. Clear, full vision is provided, and the operator sits on the left in the customary, natural position for safe driving. The truck cooling fan exhausts engine heat away from the driver.

Steering is made easier by automotive camber design. Inclinded king pins and articulated wheels permit the truck to "step over" floor bumps without a jar. The truck is designed with an eye to easy maintenance.

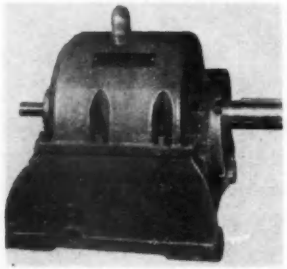
C-119—Double Reduction Speed Reducer

New type DB double-reduction speed reducers, in ratings from 1 to 100 hp, available from Westinghouse Electric Corp., Pittsburgh, Pa., are designed for applications on small- to medium-size drives where the prime mover is coupled or belted to the gear unit.

These double-reduction speed reducers use all-external type helical gearing, arranged in a horizontal plane. When coupled to an electric motor, a straight-line drive results. Eight unit sizes are available; 12 standard gear ratios range from 6.25 to 58.3:1.

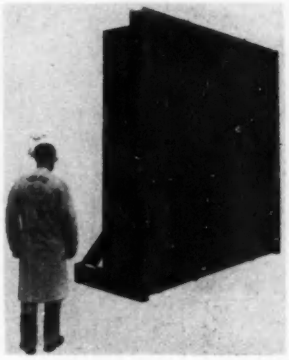
Other provisions include: accurately hobbed single-helical gearing, taper hardened by the Westinghouse BPT process; split-construction cast iron case for accessibility; simple, positive splash lubrication system; antifriction bearings; efficiencies averaging 96 per cent.

The units are manufactured in accordance with recommended practices of the A.G.M.A.



Westinghouse 1- to 100-HP double-reduction speed reducers, type DB

C-120—Engine Jacket Water Coolers



Young improved line of engine jacket water coolers

An improved line of engine jacket water coolers, placed on the market by Young Radiator Co., Racine, Wis., and Mattoon, Ill., are Mono-Weld welded steel units said to be more compact, and more rugged than their predecessors. Gas and/or lube oil cooling coils may be mounted between the fan and liquid cooling core. The blower-type fan cools the oil and/or gas cooling coils first, with a minimum rise in air temperature, little affecting the cooling properties of the air flow over the liquid cooling core. This core arrangement is said to make possible a lower fan-horsepower requirement than the more conventional arrangements.

Vertical water flow, heavy formed steel channel side members, steel side suports for cores, press-formed heavy weight non-ferrous headers (specially reinforced)—and many other features are said to provide a unit capable of resisting vibration and of lasting the life of the engine.

(*Turn to page 66, please*)

Publications AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

A-141 Portable Tools

Portable Electric Tools, Inc.—Catalog, No. 50A, describes and illustrates various electric hand tools and accessories made by the company.

A-142 Lubricant

Climax Molybdenum Co.—A booklet, "Molybdenum Disulfide as a Lubricant" is now being offered. It is composed of several excerpts from technical papers on the subject.

A-143 Adhesives

Armstrong Cork Co.—Just issued is a 32-page manual, "Armstrong's Adhesives for Industry," covering the properties and uses of various bonding materials.

A-144 Radiators

Young Radiator Co.—Recently released is a new four-page, two-color catalog No. 1351, on an improved line of engine jacket water coolers. The catalog sets forth in detail the design features of the new units and describes accessories available as optional equipment.

A-145 Services

Bendix Aviation Corp.—A 40-page booklet just issued by the corporation lists the hundreds of different products supplied by the corporation's 15 plants to all phases of American industry.

A-146 Fans and Blowers

Schwitzer-Cummins Co.—The company's line of 1951 ventilating fans and centrifugal blowers are illustrated and described in a new pamphlet that is being offered.

A-147 Engines

Wisconsin Motor Corp.—Now available is the latest issue of the "Enginews" which gives some new applications of the firm's engines.

A-148 Springs

Associated Spring Corp.—Spring No. 13, Coil No. 12 of "The Mainspring," the corporation's monthly publication, contains an article on the shot-peening of springs.

A-149 Torque Converters

Twin Disc Clutch Co.—A new 16-page brochure, just recently issued, gives applications of several models of the Twin Disc torque converter.

A-150 Rotary Electric Products

Eicor, Inc.—Containing several leaflets, a new folder is devoted to the specifications and descriptions of inverters, alternators, dynamotors, and dc motors.

A-151 Surface Preparation of Metals

Oakite Products, Inc.—Helpful data on materials and procedures that produce the chemically clean surfaces required for black oxide finishing of metals is presented in a special Service Report.

A-152 Shot Peening

Cleveland Metal Abrasive Co.—Recently published is a four-page folder

(*Turn to page 98, please*)

TIME SAVER COUPON

THIS TIME SAVER COUPON is for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

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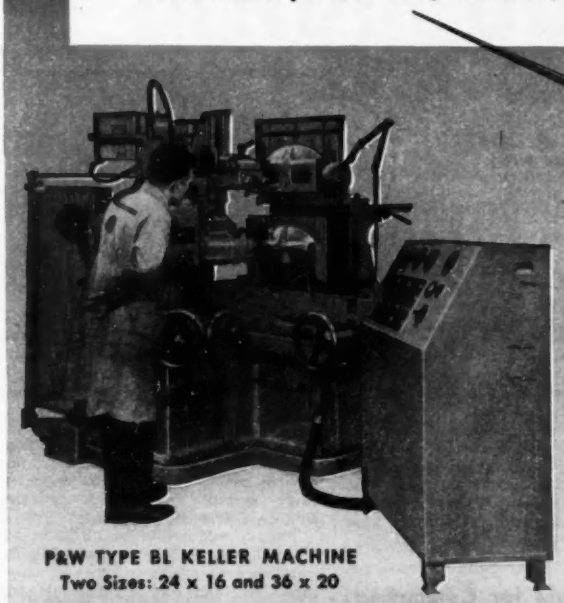
(AS APPLIED TO AIRCRAFT PRODUCTION)

KELLERING is the sure way to keep pace with urgent demands for accurate prototypes in metal — without the need for . . . and expense of . . . preliminary forging dies.



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Two Sizes: 24 x 16 and 36 x 20

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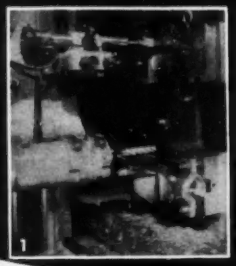
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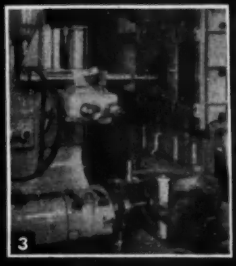
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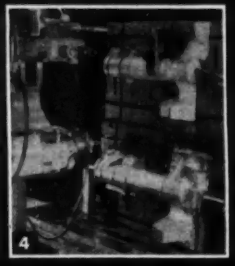
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(1) KELLERING of forged steel aircraft landing gear yokes.

(2) KELLERING complex contours of magnesium aircraft wing fittings.

(3) KELLERING inside contours of forged steel aircraft catapult hooks.

(4) KELLERING steel prototype of aircraft landing gear cylinder.

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for the economical production of parts for prototypes and pilot models

NEW PRODUCTS for AIRCRAFT

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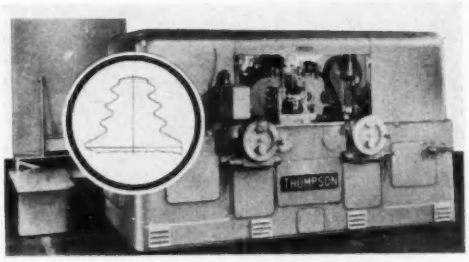
R-33—Jet Aircraft Bucket And Blade Grinder

Automatic contour grinding with two wheels simultaneously, and dressing from a single crusher roll, now assures perfect symmetry in machining the root section of turbine buckets, as incorporated in the automatic double wheel truforming machine put out by the Thompson Grinder Co. of Springfield, Ohio. A typical turbine bucket of "pine tree" design, shown in inset in cross section, is approximately 2 in. long with .150 in. stock removal per side from the rough to the finish size, as machined on the new Thompson machine. Hood doors of the machine, work clamps, coolant flow and grinding cycle are actuated in automatic sequence from the centralized control panel at the right side of the machine.

On this double wheel truforming machine the bucket at .150 in. of stock removal per side is said to be produceable at a "day in" and "day out" rate of 30 buckets per hr. The production rate takes into consideration the down time for dressing, regrinding the crusher roll, initial machine warm-up period, and wheel changing and diamond changing. The actual productive time of grinding one bucket is stated as 110 seconds floor to floor.

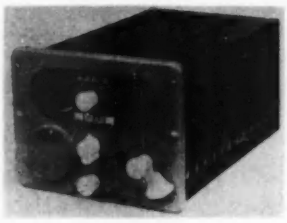


Thompson automatic double wheel bucket and blade grinder, for jet aircraft.

R-34—Communication and Navigation Aid

National Aeronautical Corp., Ambler, Pa., is in production on their Omnihomer VHT-1, a new, low-cost unit said to bring the advantages of VHF communication and navigation within the means of every aircraft owner. The Omnihomer is engineered into a single 8½ lb package, claimed basically the simplest of all navigation sets. Small, 5¼ by 6⅞ by 10¼ in., is declared easy to install, since there is only one unit to mount on the instrument panel.

The receiver tunes from 108 mc to 127 ms. A geared down crank tuner allows easy selection of desired frequency. The transmitter is supplied with 122.1 and 122.5 mc crystals with provision for two extra crystals which may be added at additional cost.



Narco Omnihomer

R-35—Rule for Computing Aircraft Data

Douglas pocket "Sky Rule" for computing aircraft performance data.

Quick and easy computation of aircraft performance data required by engineers and pilots is possible on a new slide rule developed by the Douglas Aircraft Co., Inc., Santa Monica, Calif. Named the sky rule, the six-in. light-metal pocket rule gives "on the spot" answers to common aeronautical problems, without reference to voluminous text books and charts.

It has, in addition to the conventional C, D and A scales, 20 others peculiar to aviation and said not found on any other single device. Scale markings are theoretically accurate to one ten-thousandth of an in., it is declared.

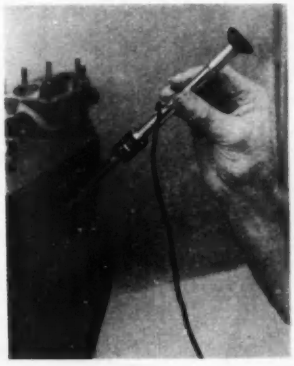
With the sky rule it is possible to determine at a glance the Mach number, true air speed, indicated air speed, density altitude, temperature rise and other aeronautical functions. Airplane performance may be evaluated either in mph or knots without reference to conversion tables.

Two scales permit conversion from degrees C to corresponding F readings and two additional scales convert from mph to knots. Conversion factors also cover several relationships in the English and metric systems.

The sky rule is 6 in. by 1 3/32 in. by 3/32 in. in size. The warp-proof light-metal core maintains accuracy in moisture, heat and cold. White surfaces make the black, needle-sharp scales easy to read.

R-36—Optical Inspection Instrument

A long tubular and highly accurate optical inspection instrument called a



Testa optical inspection instrument, the Borescope

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PRESSURE TIGHT SOCKET CONTACTS

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- Radio Quiet
- Single-piece Inserts
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- Light Weight
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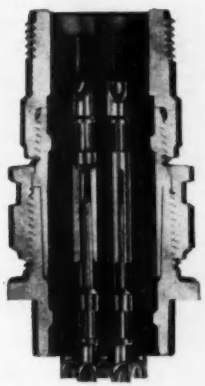
- Easy Assembly and Disassembly
- Fewer Parts than any other Connector
- No additional solder required

Outstanding design and precision workmanship assure completely pressurized electrical connectors for all sizes of contacts. A truly important feature, but only one of the many exclusive advantages that contribute toward making Bendix outstanding in the electrical connector field. Increased resistance to flash over and creepage is made possible by the use of Scinflex dielectric material—an exclusive development of Bendix. In temperature extremes, from −67°F. to +275°F. performance is remarkable. Dielectric strength is never less than 300 volts per mil. Remember, for the greatest value in electrical connectors, it pays to specify Bendix. Our sales department will gladly furnish complete information on request.

PLUS



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High strength aluminum alloy . . . High resistance to corrosion . . . with surface finish.

CONTACTS
High current capacity . . . Low voltage drop.

SCINFLEX ONE-PIECE INSERT
High dielectric strength . . . High insulation resistance.

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NEW PRODUCTS for AIRCRAFT

For additional information please use coupon on page 60

Borescope which has been developed by Testa Mfg. Co., Los Angeles, Calif., for research and inspection in aircraft and other defense plants, can be used to investigate and inspect the inside walls or surfaces of hollow castings, engine cylinders, gun barrels, crank cases, etc., which are otherwise inaccessible for the human eye.

The internal walls appear magnified in the large optical field of the instrument. It is possible, therefore, to study the surface finish, wear, and to determine cracks, porosity, corrosion or other important imperfections which may lead to a breakdown of the part in operation. Use of the instrument eliminates time-consuming disassemblies or destruction of sample parts.

The instrument measures ½ in. dia by 1½ ft length. It has an achromatized and fully corrected system, furnishing a sharp, magnified and brightly illuminated image of 30 deg at right angles to the instrument access. Electric illumination is built into the borescope end, wired through its tube so that contact can be made outside the inspection piece. All lenses are fluoride-coated.

R-37—Gang Channel and Anchor Nuts

Of importance to manufacturers of airframes and components are two new designs in a light-weight series of gang channel and anchor nuts introduced by the Elastic Stop Nut Corp. of America, Union, N. J., that effect weight savings from 25 to 30 per cent with no sacrifice in strength. With the same high strength of previous designs, but with less metal used, this new gang channel

ESNA new light-weight gang channel and anchor nuts shown compared with the old types. Anchor nut in left foreground permits 25 per cent savings in weight, compared with old type anchor nut behind it. Next in picture is the new gang channel nut strip permitting 30 per cent savings in weight, compared with the old strip at far right.

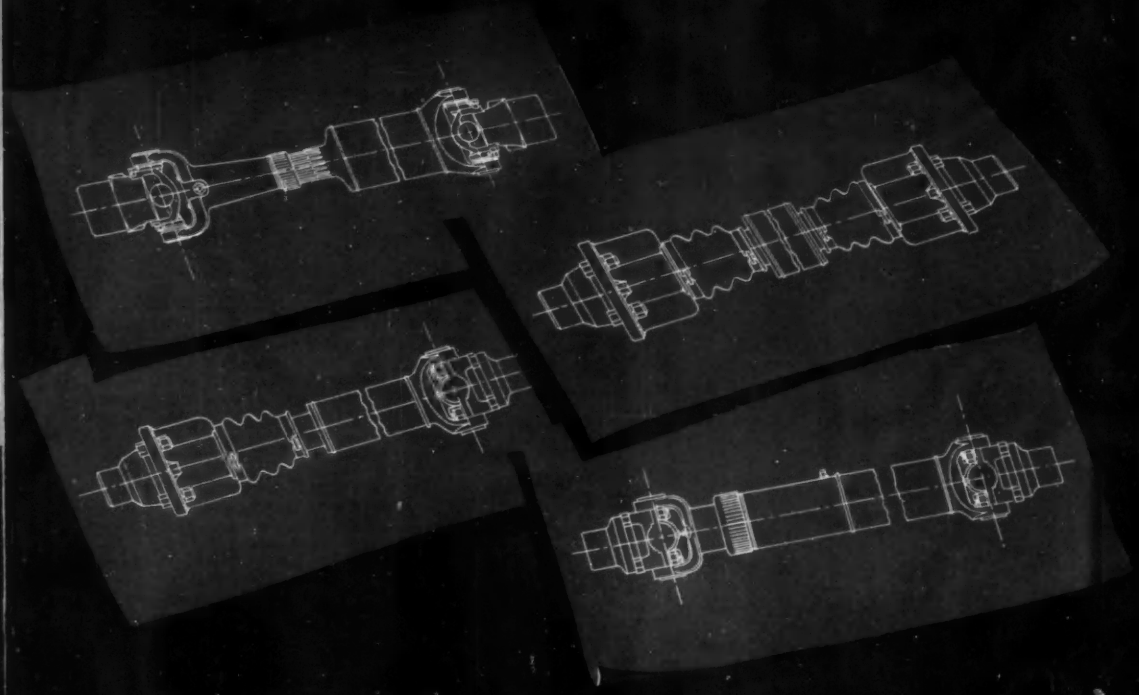
nut is 30 per cent lighter and the new anchor or plate nut is 25 per cent lighter than similar fasteners now used.

These new parts are manufactured in conformance with Specification AN-366, and are approved for use by aircraft manufacturers. The new designs are now available for applications where heavier types of nuts have been used, and both are directly interchangeable with other AN parts, since they are designed within the same overall envelope dimensions.

The characteristic ESNA red elastic locking collar of these nuts assures reusability, keeps bolt and nut threads rust-free, and seals against liquid seepage. This insert provides a constant self-locking torque, said to make accurate bolt loading easy, and, at the same time, to protect the fastenings against vibration, impact, and shock.

ESNA supplies the gang channel strip already assembled in an extra-tough 24S-T4 aluminum alloy channel, blue anodized for easy identification. Even though designed to retain nuts in position over bolts, the channel permits play to allow for mis-alignment.

Over 38 Years of Concentration on One Product . . .



. . . Assures Superiority of "DETROIT" Universal Joints

By specializing in the design and manufacturing of one product — — "DETROIT" Universal Joints — — we have gained the experience needed to cooperate efficiently with automotive engineers in handling power transmission problems.

Detroit UNIVERSAL JOINTS

UNIVERSAL PRODUCTS COMPANY, Inc., Dearborn, Michigan

NEW PRODUCTS

(*Continued from page* 58)

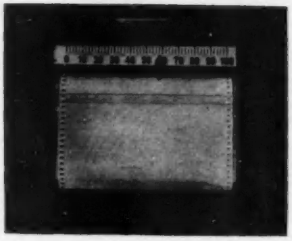
C-121—Automatic Function Plotter

The automatic compiling of two measurements and plotting of a curve to show their interrelationship, namely: Y equals f (X), is made possible by a new electronic instrument called the Brown ElectroniK function plotter, developed by Minneapolis-Honeywell Regulator Co., Phila., Pa. Said by the company's Brown Instruments division engineers to incorporate two measuring systems, one actuates the recorder pen while the other motivates the instrument chart.

With this arrangement the chart is driven up and down in response to the changes in one variable simultaneously with the movement of the pen in response to changes in a second variable. The result is a curve which continuously evaluates one variable in terms of the other.

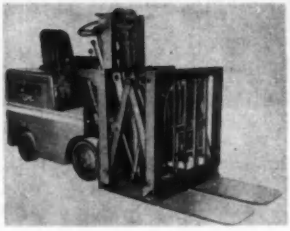
Laboratory or over-all industrial investigations, involving such interdependent non-linear variable, are said to be greatly facilitated with the function plotter compared to manually plotting curves from data laboriously collected point by point. With the function plotter not only are measurements compiled and the curves plotted automatically, but also measurements over the entire curve are continuous and so require no interpolation to complete data between points of measurement.

For additional information please use coupon on page 60



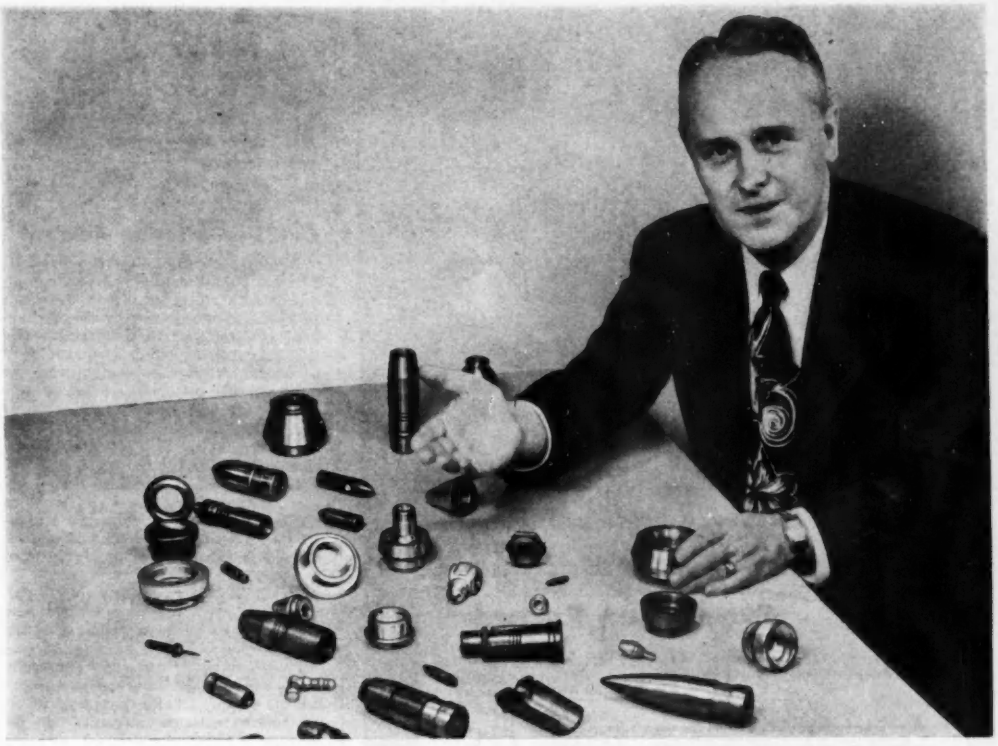
Minneapolis Honeywell Brown ElectroniK function plotter

C-122—Puller-and-Pusher For Clipper Lift Trucks



Pul-Pac and Pusher devices recently announced by Clark Equipment Co., Battle Creek, Mich., for 3000 to 5000-lb "Carloaded" fork trucks, which feature pantograph-type linkage, more powerful piston and shorter stroke, are now available for both gas and electric 2000-lb capacity Clipper lift trucks. Unit loads, assembled on relatively inexpensive carrier sheets rather than on conventional pallets, can be pulled onto and pushed off the load-carrying plates with the Ful-Pac device. The Pusher device, similar to the Pul-Pac excepting for the gripping mechanism and carrying-plate, is used for unloading operations only. Unit loads can be unloaded directly from the forks or from conventional pallets with the Pusher whenever rehandling as a unit is not required.

(*Turn to page* 68, *please*)



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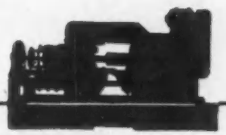
We've done your preliminary planning for you.

All the educational orders, the trial setups, the essential steps for automatic production of parts for quick rearmament were thought out—and *proved* out—months ago by National Acme tool engineers.

Today, Acme-Gridley Automatics, by the hundreds, already are meeting the tolerances and time limits, turning out untold millions of these armament parts.

This ready-made experience—standardized tooling, standardized production methods and engineering techniques—plus the latest developments for top performance on your Acme-Gridleys—these are your safest guide to quick action and *profit*.

Bridge that experimental gap—start with National Acme's ready-made reliable experience. Just tell our engineers what you need.



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No other source offers a line so COMPLETE—so much design and tooling EXPERIENCE in Multiple and Single Spindle Bar and Chucking Automatics.

NEW PRODUCTS

For additional information please use coupon on page 60

(*Continued from page 66*)

C-123—Reclosing Relay

A new reclosing relay (type ACR), for use on automatic reclosing equipments with all types of power circuit breakers, is announced by the Switchgear Divisions of the General Electric Co., Schenectady, N. Y. The completely automatic reclosing equipments, by automatically restoring service, protect feeders against unnecessary outages due to temporary faults.

Features of the new relay, not available in previous designs, are optional automatic reset at a definite time after any successful reclosure attempt; a self-contained means for permitting instantaneous initial and time-delay subsequent breaker tripping; and faster immediate reclosure.

The ACR relay may be adjusted for one, two, or three delayed reclosures in addition to the immediate reclosure. The delayed reclosures occur at 15 second minimum intervals. By adjustment of the cams, longer intervals can be obtained; or the definite-time reset after immediate reclosure attempts can be omitted, in which case delayed-reclosure intervals as short as 5 seconds can be obtained. The connections of the relay can be easily changed to omit the immediate initial reclosure.

Until now, it has been necessary to use separate auxiliary relays with the reclosing relay to obtain immediate reclosure and to permit "instantaneous initial trip, time-delay subsequent trip" operation. The type ACR relay, however, includes contacts which perform these functions.

C-124—New Type Hand Push Trolley

Jervis B. Webb Co., Detroit, Mich., has brought out a new 6 in. hand push trolley for heavy loads and short radius curves. Two No. 6970 2-wheel trolleys are mounted on a steel load bar so that they can negotiate a minimum of an 18 in. radius curve.

The trolley is for use in foundries which do not require a continuous trolley conveyor. Side rollers prevent the trolley from binding on the I-beam when making a curve; and the use of ball bearings with ground races enables one man to push a ladle or any other load up to one ton with ease. Two of these trolley assemblies connected to a third load bar would permit handling a two-ton load.

Trolleys are adapted only for use on standard 6 in. 12.5 lb I-beams.

(*Turn to page 72, please*)


MAINTENANCE SERVICE
UNIFIED RESPONSIBILITY
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RESEARCH, DEVELOPMENT AND TESTING
CO-ORDINATED ENGINEERING DESIGN
WESTINGHOUSE
DO NOT LUBRICATE
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PAIRED FOR PRODUCTION
Life-Line motor

NEW PRODUCTS

For additional information please use coupon on page 60

(*Continued from page* 68)

C-125—Forkless Handling of Hooked Pallets

A "forkless pallet" handled by hooks on a lift-truck, and a fork lift truck with "foldaway" forks, are part of a materials handling system recently demonstrated by the Automatic Transportation Co. of Chicago, Ill. The system is designed to save space two ways: Vertical storage space is saved in stacking because the pallet is only an inch thick compared to the six-inch depth of standard pallets; and horizontal storage space is saved in truck maneuvering since no extra aisle room is required for the withdrawing of forks after depositing the pallet.

Automatic Skylift electric industrial truck handles forkless pallets by means of hooks on its carriage plate.

Automatic pallet is equipped with eyes at top of its vertical metal wings into which truck's hooks insert.

Foldaway forks that hinge in vertical position when not in use are part of Automatic's new handling system.

The forkless pallet consists of a single layer of inch-thick boards inserted into a pair of form punched vertical metal "wings" which are located part way in from the sides of the unit. (In tiering these loaded, three-high, 15 inches of vertical space are saved compared to similar space used up in tiering conventional pallets.) At the top of each wing is an eye. To lift the pallet, hooks provided on the carriage plate of the lift truck are inserted into these. Because pallet construction includes no bolting or nailing, damaged boards are easily replaced. Reshipment costs are lowered not only because of the pallet's lightness, but also because it can be disassembled or folded flat.

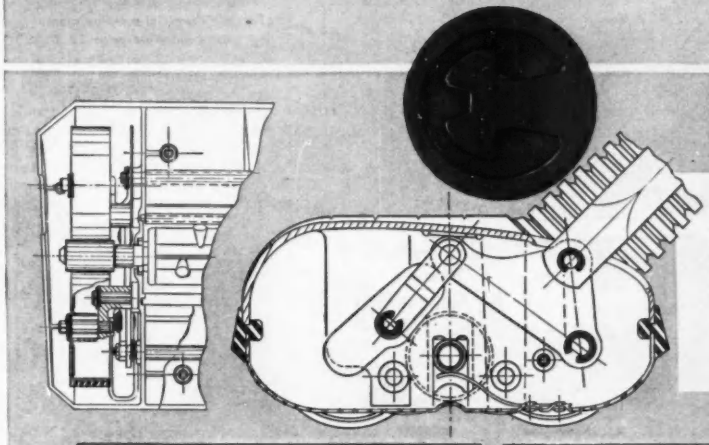
The foldaway forks on the trucks are hinged to fold up vertically and latch there when not needed. When needed, they can be lowered in a moment. This innovation perfectly integrates the truck into existing materials handling systems when not employed in the new specific hook-pallet system.

For more critical load-spotting, Automatic points out, the truck is available with a side shifter attachment to permit moving loads several inches to either the right or left, with the truck stationary.

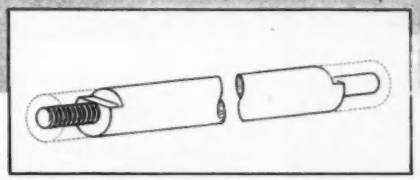
C-126—Materials Handling "Swing-Stacker"

Developed by the Thew Shovel Co., Lorain, Ohio, is a new concept of fork lift equipment to meet material handling problems heretofore said to be unsolved by any other single piece of equipment. Called a "Swing-Stacker," the equipment was originally designed by Thew to unload up-ended and nested

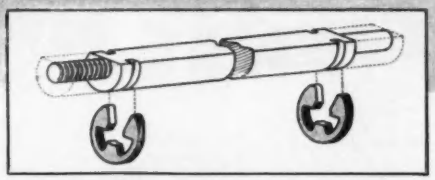
12 TRUARC RINGS SAVE 25% MATERIAL ...50% LABOR COSTS...50% ASSEMBLY TIME



With Waldes Truarc Retaining Rings, assembly in hard-to-reach places is easier, since there are no washers and bulky lock nuts. Smaller shafts can be used. Unit is smaller, lighter, more efficient!



CONVENTIONAL WAY: 2 round rods were required, milled down to D-shape. 4 threading operations to accommodate lock nuts.



TRUARC WAY: Truarc Rings allowed Lewyt Corporation to use 2 stock D-shape rods. No milling . . . no threading—just 2 grooves!

Using 12 Waldes Truarc E Retaining Rings in their new "101" Vacuum Cleaner nozzle brought the Lewyt Corporation, Brooklyn, N. Y. tremendous material and labor savings . . . eliminated 2 milling and 12 threading operations . . . made possible the use of stock extruded D-shaped rods . . . simplified maintenance. And with Waldes Truarc Rings unit is 15% lighter . . . 10% smaller overall!

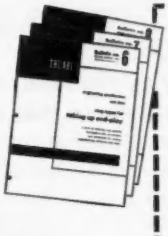
Redesign with Truarc Rings and you too will cut costs. Wherever you use machined shoulders, bolts, snap rings, cotter pins, there's a Waldes Truarc Retaining Ring designed to do a better job of holding parts together.

Waldes Truarc Rings are precision-engineered . . . quick and easy to assemble and disassemble. Always circular to give a never-failing grip. They can be used over and over again.

Find out what Truarc Rings can do for you. Send your blueprints to Waldes Truarc engineers for individual attention, without obligation.

Waldes Truarc Retaining Rings are available for immediate delivery from stock, from leading ball bearing distributors throughout the country

SEND FOR NEW BULLETINS



WALDES

TRUARC

REG. U. S. PAT. OFF.

RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

WALDES TRUARC RETAINING RINGS ARE PROTECTED BY THE FOLLOWING PATENT NUMBERS: U. S. PAT. 2,302,040; 2,420,921; 2,411,761; 2,407,003; 2,407,003; 2,491,306 AND OTHER PATS. PEND.

Waldes Kohinoor, Inc., 47-16 Austel Place AY063
Long Island City 1, N. Y.

Please send Bulletins 6, 7 and 8—giving engineering specifications for all types of Waldes Truarc Rings.

Name_____

Title_____

Company_____

Business Address:_____

City_____ Zone_____ State_____

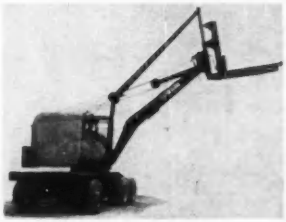
678

NEW PRODUCTS

For additional information please use coupon on page 60

car and truck frames from gondola cars and to carry them to storage areas.

On a standard rubber-tired Lorain SP-414 self-propelled carrier and turntable are mounted a specially designed front end consisting of a hydraulically

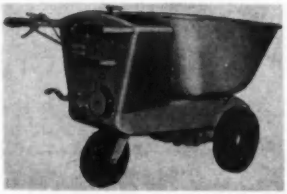


Thew "Swing-Stacker"

operated fork lift attachment fixed to a boom. The 7 ft long forks have a vertical lift of 9 ft 8 in., can rotate 180 deg, and can be tilted up and down approximately 10 deg. With boom completely raised and the fork lift completely elevated, a height of 27 ft can be reached. In addition, the turntable and fork lift front end can revolve through 360 deg as can any Lorain crane. Top travel speed is 7 mph with load.

Lifting capacity of the Swing-Stacker in any position is 5000 lbs, enabling heavy, bulky loads to be lifted, rotated, swung and transported.

C-127—Prime Mover With Platform or Bucket



Model 15 prime mover, built by the Prime-Mover Co. of Muscatine, Iowa, hauls up to 1500 lbs, takes steep ramps, is provided with direct drive forward and half-speed reverse under power, and has enclosed gear-driven constant-mesh transmission. A 9 or 14 sq ft platform is quickly interchangeable with a ten cu ft bucket. The unit, with turning radius of wheels at 33 in. and only 31½ in. in width overall, finds use in moving sand and castings in foundries, handling raw material and scrap, and loading and unloading cars and trucks.

Hydro-Lectric Window Lifts Are a Natural for the "Hard Top"

The low, sleek and racy lines of the "Hard Top" are enhanced by the absence of window pillars. Owners delight in lowering all windows to obtain as much of the convertible effect as possible. That's why Hydro-Lectric window regulators belong on every "Hard Top." With a touch of a finger the driver can instantly raise or lower all windows without having to crawl over the back of the seat.

The Hydro-Lectric system, developed by Detroit Harvester is recognized by automotive engineers as the trouble-free and always dependable system of automatic window operation.

Over a million ***Hydro-Lectric*** *systems prove their dependability*

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the South Wind "978"

keeps vision clear, vehicles warm

● Keeping Army Vehicles rolling in the coldest weather—that's South Wind's famous "978"! This powerful forced-air heater takes the frost off the windshields, keeps the freeze out of cabs. It pre-heats, heats, and defrosts in any type of military vehicle in temperatures as low as 70 below zero. Built to Army Ordnance specifications . . . widely accepted by the Army for its winterization program . . . the "978" is compact, simplified in design—easy to install, economical to maintain. Safe because the combustion air system is completely separated from the ventilating air stream. Fast acting because warm air circulation doesn't depend on engine heat.

At Your Service: The cooperation of Stewart-Warner's widely experienced staff of heating engineers. You can enlist their help *with confidence* when working this practical heating system into your Ordnance program . . . and in fashioning future designs for commercial car heating, too. For information, complete details, write Stewart-Warner at the address below—today!

Stewart-Warner Corporation

South Wind Division—Indianapolis 7, Indiana

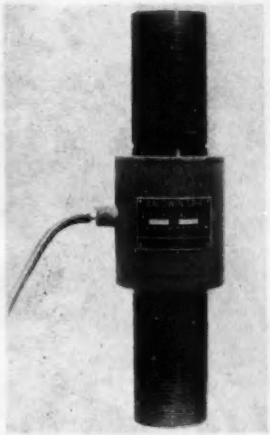
NEW PRODUCTS

For additional information please use coupon on page 60

(*Continued from page* 74)

C-128—New SR-4 Load Cells

SR-4 load cells for measuring forces or weights in tension only have been placed on the market by Baldwin-Lima-Hamilton Corp., Phila., Pa. Load capacities of the new standard Type P load cells are 10,000, 20,000, 50,000 and 100,000 lb. Other sizes will be made to order.



Baldwin SR-4 Type P load cells, based on resistance wire strain gages. Largest of these units is 15 in. long and 3 in. in diam at the threaded ends. Cover is 4¼ in. in diam.

Load measurement is based on use of special SR-4 resistance wire strain gages bonded to a load-carrying shaft. The gages respond to infinitesimal stretch of the shaft under tensional load by a change in electrical resistance that varies the voltage. This change of voltage is measurable on a direct-reading dial indicator or a recorder of either the resistance potentiometer type or the sensitive micro-ammeter type. It may also be used to actuate relays for automatic control mechanisms. Electrical instrumentation may be located near or far away from the load sensitive element.

A single indicator may be used to obtain separate measurements from a number of load cells, if desired, or a load may be distributed among several cells whose combined output may be automatically totalized.

Accuracy of measurement is within ±¼ per cent of rated capacity. The cells are temperature and modulus compensated. Standard cells loaded to capacity for several weeks at room temperature varied a maximum of 0.1 per cent of the initial load without change in measuring performance. The cell is made relatively impervious to moisture and dirt by O-ring seals. Circuits may also be protected by sealed conduits.

Applications include static load tests on aircraft structures and assemblies, suspension of tanks and platforms, measurement of thrust carried in tension, engine dynamometers, portable weighing hoppers, and cable tension testing.

(*Turn to page* 102, *please*)

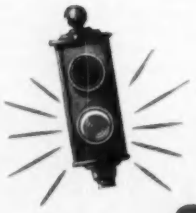
Variable-Rate Suspension for French Renault Car

(*Continued from page* 53)

was about 1.4 in. per 220 lb per wheel, whatever the load. With the Gregoire suspension it is 2.2 in. per 220 lb per wheel with the driver only aboard and becomes 1.7 in. per 220 lb with the full load of four persons.

This suspension was used on the four small Renaults which crossed Africa from south to north. Claims for it are additional comfort under all loads, better road-holding ability, and reduced wear of shock absorbers.

STOP & GO



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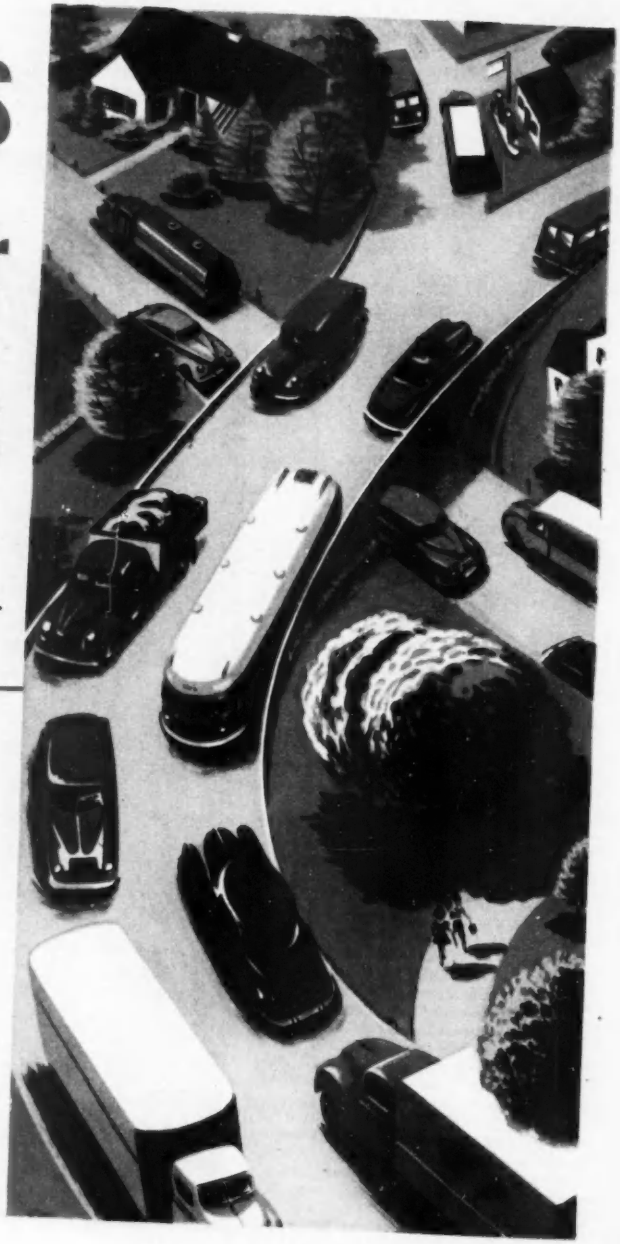

EVERYONE who drives...and that means everyone from the average motorist to drivers of the biggest buses and trailer trucks... wants safe, sure stops and quick, smooth starts. What they want takes the finest brake lining, brake blocks, clutch facings, and engineered automatic transmission parts.

That's why vehicle manufacturers, as well as makers of many other kinds of equipment, rely on Raybestos-Manhattan, the world's leading supplier of friction materials. They know from experience that R/M STOP AND GO products meet every requirement... can always be counted on for greater safety and longer, more economical wear.

R/M friction materials are serving today in applications that vary from heavy-duty trucks to tiny precision parts for adding machines. This diversity provides a breadth of experience that can be most helpful to you.

Remember that when you call in your R/M representative, you enlist the full support of four great plants, four research departments, and four testing laboratories!

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R M
FIRST IN FRICTION

GM 19XX Engine

(*Continued from page 47*)

matically when the acceleration of the special was matched with that of the standard 1951 model at lower speeds.

In Fig. 1 the performance comparison is plotted by using the 1951 model as a standard; it is therefore the zero line on the curve. The plot shows the distance of the other cars ahead of or behind the 1951 car at various times after the start. It can be seen that the 1915 and 1935 cars fall back of the 1951 car very rapidly after the start. The 1951 and 19XX cars have practically the same performance from a standing start to the limit of the test. This was the aim in fitting the 12 to 1 engine in the Cadillac chassis.

After the performance comparison, a graph was made of the economy picture, Fig. 2. This is a plot of miles per gallon at various level road constant speeds for the four cars. If a cruising speed of 40 mph is taken, the 1915 car obtained 9.5 mpg; the 1935 car, 13 mpg; the 1951 car, 19.8 mpg; and the 19XX car, 27.6 mpg. It is interesting to note that between 1915 and 1951, miles per gallon have been increased more than 100 per cent by Cadillac. If the 1915 figures are compared with those possible with the 19XX car, the miles per gallon can be increased almost 200 per cent.

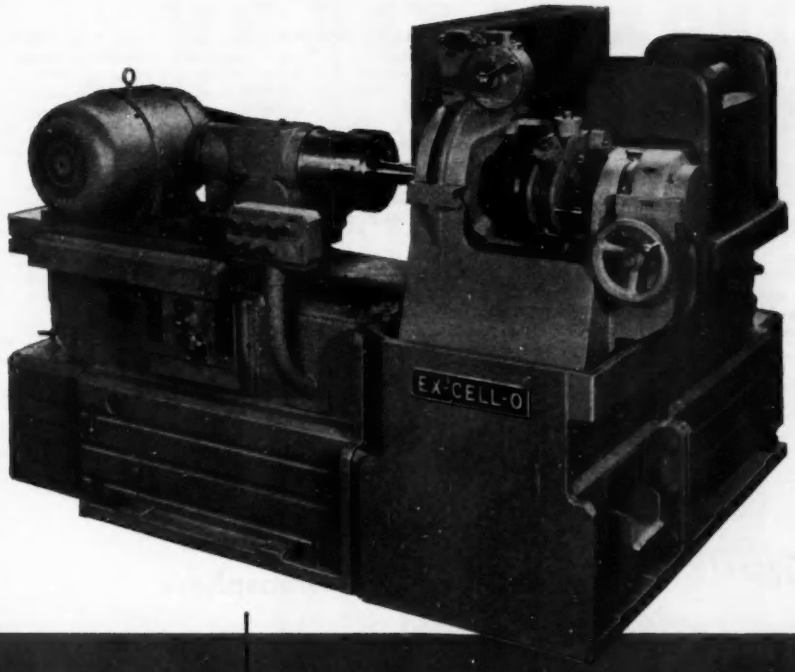
The special 19XX gave from 29 mpg at 30 mph to 19.6 mpg at 70 mph. If the cruising speed of 40 mph is used as a point for comparison of the economy of the 1951 and the 19XX cars, the gain in economy is 39.5 per cent. In fact, throughout the speed range from 30 to 70 mph, the gain was consistently from 29 to 40 per cent.

Large gains in economy were confirmed by further tests on the 1951 and 19XX cars made under city traffic and open highway driving conditions. From experience, it would be conservative to say that a saving of 30 per cent over present fuel consumption is possible with a combination of 12 to 1 engines and new types of automatic transmissions.

A comparison of ton-miles per gallon, shown in Fig. 3, illustrates the gains made when the data for differences in car weight is corrected. The large gains in ton-miles per gallon between 1915 and 1951 show the fundamental engineering progress that has been made over this period of 36 years. During this long period, ton-miles per gallon at 40 mph have been improved 125 per cent—an increase from 22.5 to 50.5. A comparison of the figures for 1915 with those that can be obtained with the 19XX car, shows that it is possible to obtain an increase from 22.5 to 69.5 ton-miles per gallon or well over 200 per cent improvement.

These comparisons show, in a practical way, the large improvements in performance and economy which have

(*Turn to page 82, please*)

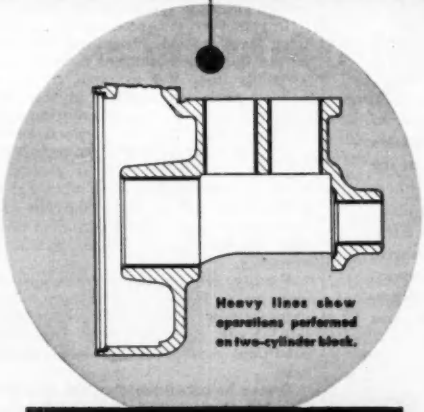


Ex-Cell-O Two-Way Precision Boring Machine, with fixture that accommodates two- and three-cylinder in-line refrigerator compressor blocks; four- and six-cylinder V-type blocks.

XLO
EX-CELL-O Air PRECISION

EX-CELL-O

WAY MACHINE BORES CYLINDERS AND CRANK BEARINGS SIMULTANEOUSLY



Heavy lines show operations performed on two-cylinder block.

ACCURACY OF 90° ANGLE IS BUILT INTO MACHINE

This Ex-Cell-O Way Machine precision bores cylinders and crankshaft bearings of refrigerator compressor bodies, holding a 90° angle between the bores within .001″ in 14″. When operations from two directions are performed on one machine the possibility of error in relocating and reclamping the part for each operation is eliminated. Thus the accurate relationship of one operation to another is built into the machine. And of course, doing the operations simultaneously saves time and money too.

Ex-Cell-O Way Type Precision Boring Machines are built up by combining standard way units with a center section and adding tooling to fit the job. Standard way units are economical, self-contained, and can be used over and over again in different combinations. For full information, contact your local Ex-Cell-O representative, or write Ex-Cell-O in Detroit today.

EX-CELL-O

51-2

CORPORATION
DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS
RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT
AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

been made by a typical progressive manufacturer over the years. They demonstrate that still further gains will be made in the future.

Each of these cars, with the exception of the experimental 12 to 1 compression ratio car, was designed to operate on fuels current at the time of its manufacture. Fig. 4 shows the results of road octane requirement tests on the four Cadillacs in terms of the primary reference fuels, iso-octane and normal heptane. Thus, the 1915 car had an octane requirement of 60; the 1935 car had an octane requirement of 67; and the 1951 car used in these tests had an octane requirement of only 85 when the combustion chamber was clean. However, experience indicates that fuels of 90 to 92 Research octane number may be required for the 1951 engine after the accumulation of combustion chamber deposits in service.

The octane number requirement of the 12 to 1 compression ratio car used in these tests was equal to 100 octane plus 0.4 ml. TEL, estimated to be equivalent to about 103 octane number. This is 0.5 ml. TEL less than that of the 12.5 to 1 compression engine demonstrated by General Motors in 1947, which had an octane requirement estimated to be in the order of 105.

It is believed that commercial developments within the next few years will be found somewhere between present GM production designs of 7.5 to 1 compression ratio and the compression ratios represented by these experimental 12 to 1 compression engines. The extent to which this trend can be applied commercially will depend upon the progress that can be made with "mechanical octane numbers" and the extent to which technological progress in the petroleum industry permits the general distribution of fuels of higher octane number. No doubt the normal competitive forces operating in a free economy will determine how high it is commercially possible to go in increasing compression ratios and octane number of fuels. These forces will also determine how rapidly progress can be made in obtaining higher engine efficiencies in production automobiles.

Controlled Atmosphere

(*Continued from page 33*)

special tackle for loading on an overhead trolley which runs on a single rail near the wall. This craneway, reaching from the assembly line to the test stands in the rear, runs about 250 ft.

Meanwhile, the dollies come off the end of the assembly line, turn 180 deg and return automatically to the start of the assembly line by entering the enclosure at the left as shown. On the return trip the dollies pass through a small washer where they are cleaned before entering the assembly room.

In summary, it is noteworthy that all parts are cleaned a number of times before they are permitted to reach the assembly line. For example, the component parts are cleaned in the machine shop area before entering the storage bins. They are cleaned again before entering the assembly enclosure. Similarly the cylinder liner assembly has had the components thoroughly cleaned before selective assembly in the temperature controlled booth, then they are washed again before reaching assembly.

Finally, all internal parts assembly, right up to the point of installing the valve covers, is done within the insulated booth under the most favorable conditions conducive to complete cleanness.

It may be noted, too, that the straight line layout described here, with complete mechanization of all steps, results in a rhythmic cycle free from lost motion, contributing to maximum economy. Thus the job of producing clean engines and added durability is done without imposing a cost penalty.

WE SAY IT AGAIN!

DUALOY*

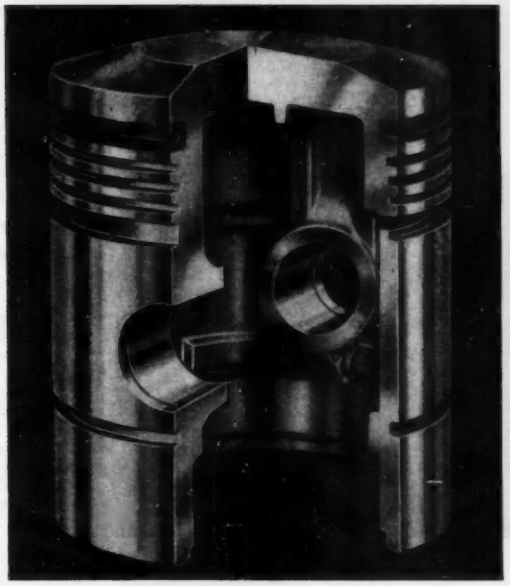
THE BI-METALLIC MOLECULAR BONDED PISTON

HAS NO EQUAL

Eliminate excessive top ring groove **Wear**

Prevent piston ring **Breakage**

Reduce operating and maintenance **Costs**

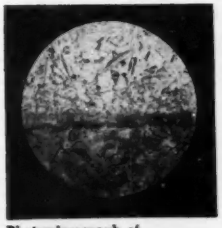


Austenitic Iron ring carrier for **Strength**

Aluminum Alloy body for **Lightness**

Silv-o-lite precision standards for **Quality**

The 200,000 Mile Heavy Duty Piston



Photomicrograph of Bi-metallic Molecular Bond

Cost conscious operators of heavy duty equipment have hoped for the day when heavy duty pistons will have an operating life, *consistently* in excess of 200,000 miles.

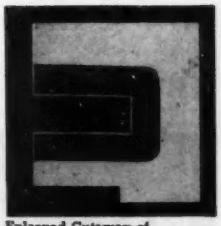
Many DUALOY* installations have exceeded this mileage and continue in service. Many more DUALOY* installations are approaching this ideal of operation.

For longer piston life, insist on *genuine* DUALOY*, the only bi-metallic piston with the molecular bonded ni-resist top ring carrier.

*Trademark Registered.

*The United Engine & Machine Company (manufacturers of Silv-o-lite pistons) are licensed by Fairchild Engine & Airplane Corporation under patents 2396730 and 2455457 to use the Al-fin process in the manufacture of bi-metallic molecular bonded pistons.

Only pistons manufactured by this company under this exclusive patent are DUALOY* pistons and are so labeled and sold.



Enlarged Cutaway of Ni-resist Ring Groove

UNITED ENGINE AND MACHINE COMPANY

310 PREDA STREET • SAN LEANDRO, CALIFORNIA

METALS

(*Continued from page* 49)

With tariff suspension, the domestic buyer will actually pay only one cent more for Chile copper than he has been doing. The Government, of course, will be the loser by two cents per lb.

The lead industry heard the news from the Torquay conference with mixed emotions, that the import duty on lead would be halved. The duty was increased from 1 1/16 to 2⅛ cents per lb in January of this year when the Mexican trade agreement was abrogated. After only five months it appears the old rate again will govern. Lead consumers plagued with dire shortage of the metal were well pleased. Lead producers, still mindful of the price debacle in 1949, when lead fell from 21½ cents to 12 cents per lb in two months, largely because of huge lead imports and devaluation of foreign currencies, did not cheer the announcement.

Lead in High Demand Abroad

However, it appears doubtful that the tariff cut will result in any large increase in lead imports at this time for the good reason that lead is in high demand abroad at prices considerably more than our 17-cent ceiling. Domestic demand far exceeds available supply. Some lead consumers have bought the metal on an f.a.s. basis Mexican ports at 19 to 19½ cents per lb. This means that the buyer then had to pay freight and additional charges plus the duty which brought the cost up to 22 cents, compared with the domestic ceiling of 17 cents.

Nevertheless, there is some reason to think that the peak demand for lead has been seen and the situation may become easier in the next quarter. It is very probable that consumer stocks of lead have been increasing at a rather high rate, especially in the form of finished lead products like batteries, which normally take about one-third of the total lead supply. Lead buying for the Government stock pile is definitely ended. With a decreased tempo in the automotive industries foreseen, the battery demand in 1951 may fall short of the 23,174,000 units shipped in 1950. While Government officials fail to see any possibility of a substantial increase in domestic output of copper this year, they agree that domestic mines should show an increase of about 45,000 tons of lead in 1951.

The Torquay agreements with Canada and Peru provide for a reduction in the import duty in zinc from ⅞ cent per lb to 7/10 cent. This will have no particular influence on increasing the supply from abroad. However, the supply situation appears to be a little better. Slab stocks in producers' hands increased 3400 tons in April and now

(*Turn to page* 86, *please*)

38 factory-trained field men
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total 14,500 tons. This is still a deplorably low figure, yet it represents a steady monthly increase from the record low of 8962 tons at the end of December, 1950. Any slow-up in the activity of the brass mills and foundries will find immediate reaction in demand for zinc, hence some zinc producers are a little concerned over the Army's recent large order for steel cartridge cases instead of conventional brass.

More Emphasis on Ferro Alloys

In the present defense program more emphasis is being laid on the ferro-alloys than was ever before witnessed in our National emergencies. This arises from their vital need in guided missiles, jet engines, rockets, and the whole field of electronics. Particularly necessary are tungsten, cobalt, chrome, nickel and molybdenum because of their heat resistant qualities when in alloy form. The Director of the Bureau of Mines has recently asserted, "The requirements for tungsten are now almost astronomical. We cannot possibly see how we can meet the suggested requirements in any short period of time." With this in mind OPS has established a ceiling price of $65 per unit for tungsten ore with a guarantee of $63 to domestic producers over a five-year period. May deliveries of nickel for civilian use have been limited to 15 per cent of the average monthly use in the first half of 1950. Every effort is being made to boost nickel output but the best that International Nickel can promise is a five per cent increase by the end of this year. Only in molybdenum is this country in a fairly comfortable position but its substitution for nickel and tungsten offers considerable difficulties.

CALENDAR

OF COMING SHOWS AND MEETINGS

Conventions and Meetings

Third World Petroleum Congress, The Hague, Scheveningen, Holland .....May 28-June 6

SAE National Summer Meeting, French Lick, Ind. .....June 3-8

American Gear Manufacturers Assn. (Annual Meeting), Hot Springs, Va. .....June 4-6

American Society of Mechanical Engineers semi-annual meeting, Toronto, Canada .....June 11-15

American Society for Testing Mat'ls Annual Meeting, Atlantic City, N. J. .....June 18-22

SAE National West Coast Meeting, Seattle, Wash. .....Aug. 13-15

First European Machine Tool Exhibition, Paris .....Sept. 1-10

SAE Tractor and Production Forum, Milwaukee, Wis. .....Sept. 10-13

Sixth National Instrument Conference and Exhibit, Houston, Texas Sept. 10-14

American Society of Mechanical Engineers (fall meeting) Minneapolis, Minn. .....Sept. 25-28

Nat'l Metal Trades Assn., Chicago, Ill. .....Sept. 26-28

Sixth Annual Industrial Packaging and Materials Handling Exposition, Cleveland, Ohio.....Oct. 1-4

SAE National Aeronautic, Production Forum, And Display, Biltmore Hotel, Los Angeles, Calif. ....Oct. 3-4

National Metal Congress and Exposition, Detroit, Mich. ....Oct. 15-19

SAE National Diesel Engine Meeting, Drake Hotel, Chicago, Ill. ...Oct. 29-30

SAE National Transportation Meeting, Knickerbocker Hotel, Chicago, Ill. .....Oct. 29-31

SAE National Fuels and Lubricants Meeting, Drake Hotel, Chicago Ill. .....Oct. 31-Nov. 1

American Petroleum Institute (31st Annual Meeting), Chicago, Ill. Nov. 5-8

American Society of Mechanical Engineers (annual meeting)....Nov. 25-30

SAE Annual Meeting, Detroit, Mich. .....Jan. 14-18

Pacific Automotive Show, Los Angeles, Calif. .....Feb. 28-Mar. 2

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Automatic Clutch Control

(*Continued from page* 50)

cylinder, the piston returns to its original position, and the clutch is engaged. Calibrated holes permit adjustment of the stroke of the piston, which can be made short for rapid engagement or long for a slow and progressive take-up of the drive.

The apparatus forms a single unit comprising the vacuum cylinder with the piston and connection up to the clutch release lever, a housing containing the two solenoid valves and a connection to the intake manifold. The cylinder is equipped with an air filter. Current required is approximately 0.5 amp.

Below a certain engine speed the clutch is automatically released, thus making it impossible to stall the engine. This also provides free wheeling with the engine idling, but if it is desired to use the engine as a brake on steep gradients, this can be done by shifting to a lower gear and accelerating a little. Alternatively, the appliance can be cut out by turning an ignition key and any of the gears used for braking.

On the Citroen front-wheel drive car the Bochory device is mounted under the hood. On a rear-wheel drive car it is usually placed alongside the transmission.

The Lavalette Co. is now supplying these units as standard for the latest Peugeot 203 model.

Electronic Counter

(*Continued from page* 52)

glass jet by a vacuum pump. As the gas rushes through the jet and into a small brass chamber, it is traveling at the speed of sound and any solid particles in it accumulate a small electrostatic charge.

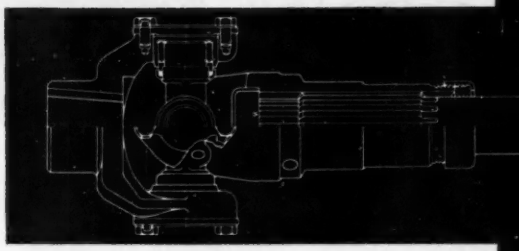
Thus charged, the particles set up electric pulses as they strike a copper wire in the chamber. These pulses are transmitted by a specially shielded cable to vibration-free amplifying and high-speed counting instruments. A preamplifier multiples the voltage by 20, and the main amplifier then multiplies it by 10,000.

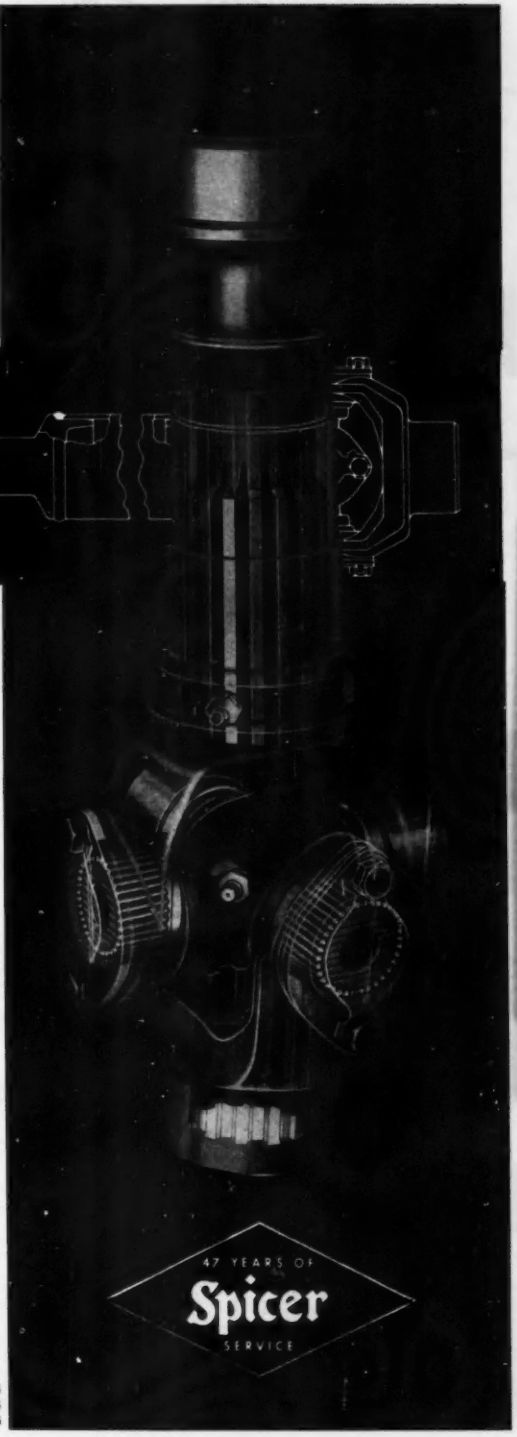
From the main amplifier the pulses travel to the discriminator where they are sorted. The discriminator can be set so that it rejects all pulses generated by particles smaller than a given diameter. Chosen pulses then go to a scaler where small indicator lights flash as it counts and registers them.

Finally, a rate computer takes the pulse count from the scaler and converts it to pulses per minute. This instrument can compute at rates as high at 200,000 pulses per min. Connected to the rate computer is a continuous pen recorder which provides a record of each test run.

LET'S TAKE AN X-RAY LOOK

at the service features in the Spicer Universal Joint





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4 Dynamically balanced to exacting limits.

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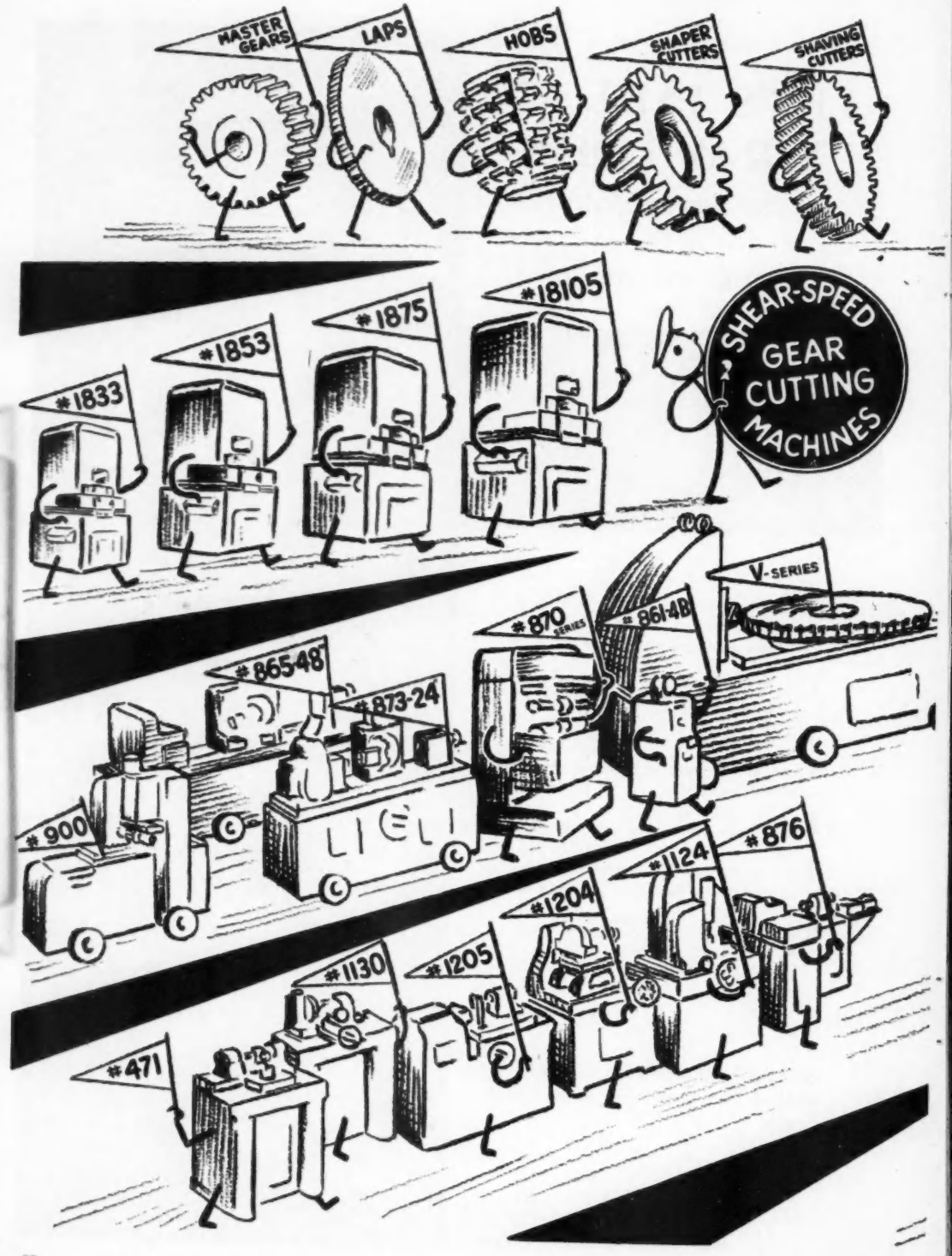
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(*) plus some omitted for lack of space.

Cadillac Equipping to Build Walker Bull-Dog Tanks

(*Continued from page* 45)

and maintenance of alignment despite floor vibrations due to the operation of heavy machines and the movement of large trucks.

Since the article was prepared before the operation was completely organized and before all of the equipment was in place, it is feasible to provide only a brief comment on some of the equipment in actual production. It is of interest that all of the welding is done in Ransome positioners, some of the largest of these being installed for welding turrets and complete hulls. The enormous Betts mill illustrated (page 43) is used for machining the turret opening in the complete hull. A similar 14-ft Betts machine is used for machining turrets.

An example of one type of special machine developed for this plant is a big Motch & Merryweather mill. It consists, essentially, of an enormous center fixture large enough to hold the complete hull, circumscribed at each of the four corners by a big milling machine for the horizontal milling of large pad surfaces.

A point of special interest is the fabrication of the turret ring. In the rough it is handled in the form of three individual steel forgings which are machined in 100-in. Betts and Niles mills. The heavier inner section carries the bull ring gear, while the raceway for bearing balls is produced by grinding individually in each of the three ring sections. This posed a neat problem not only of grinding an individual section but producing a job that would match perfectly at assembly. Grinding is done in the Betts and Niles mills equipped with special grinding heads, the ball race having a ball center diameter of 78½ in.

The bull ring gear is cut in the inner section of the three-piece ring on a big Fellows gear shaper, part of a battery of five currently installed. Some impression of the character of this job may be gained from the major specifications of this internal gear—73½ in. PD, 4-DP, and 294 teeth.

While on the subject of gear cutting, it is of interest that spur gears for the final drive are hobbed, then crown-shaved in National Broach Red Ring gear finishers. Crown-shaving not only compensates for fire distortion, but is also instrumental in eliminating edge loading, thus increases load-carrying capacity as well as endurance.

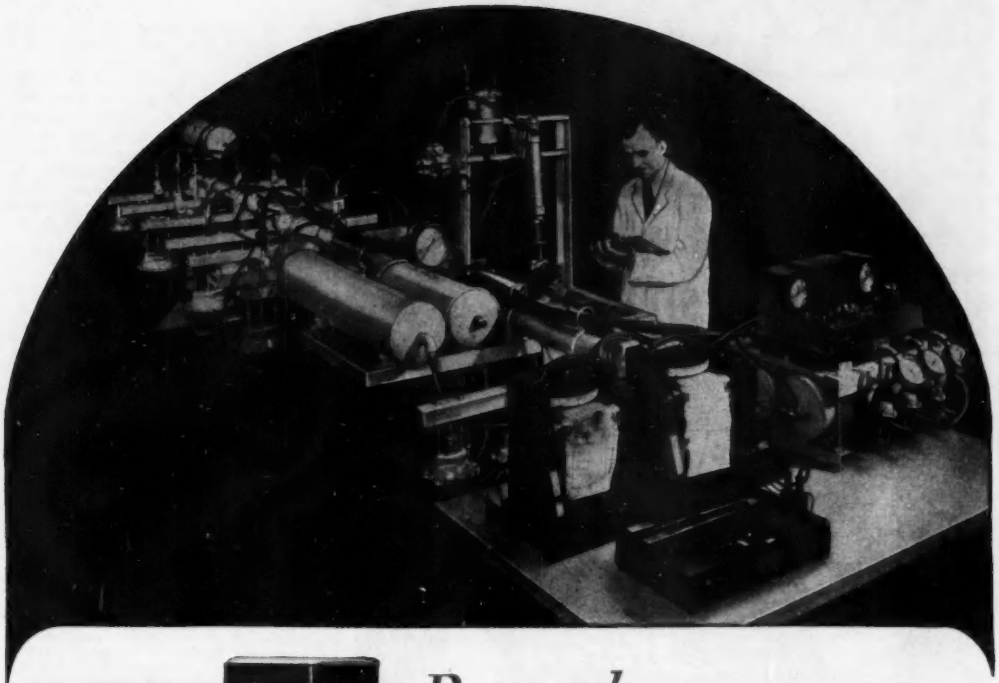
Another uncommon operation on the turret ring is the hardening of the raceway. This is done in a special Tocco induction hardening machine in which the ring is mounted on a rotary table and hardened while passing through the induction coil. Illustrated here is a temporary set-up for this operation.

Although Cadillac deals with hundreds of suppliers and sub-contractors, it is still necessary to make many component parts in this plant, including parts and assemblies which sub-contractors have been unable to undertake for one reason or another. One of the smaller details tooled up here to facilitate availability is the torsion bar. Condensed routing on this part is shown in the table on page 44.

Referring to these operations on the torsion bar, it is important to emphasize that the hobbing of serrations in the Barber-Colman hobbers is done with the shaft at a hardness of 345 Brinell (max.) which may not be a common procedure. Part of the secret of the operation is found in the hob itself, which, although of conventional design, is made of a special tool steel developed for the same operation during the war.

Another interesting feature of this

(*Turn to page . . ., please*)



Research...

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setup is the provision for hardening in the Cheston machine. As illustrated, the shaft is held on centers with the ends enveloped in induction coils.

Use of the Cincinnati Centerless Grinder for grinding the center section of the shaft also is worthy of special comment since it is so much faster and more accurate than the conventional external grinding operation.

In the near future this preliminary study will be followed by detail studies of selected operations, including operation of the final assembly line.

BOOKS . . .

ORDNANCE PRODUCTION METHODS, edited by *Charles O. Herb*, published by *The Industrial Press, 140 Lafayette Street, New York 13, N. Y.* Price $10.00. This book constitutes a collection of trade publication articles, most of which were published during World War II—some, however, were published as recently as January, 1951, dealing with ordnance manufacture. It is arranged in 10 sections according to the type of ordnance item concerned. There are a great many illustrations showing tooling setups and cutting and forming operations, as well as numerous diagrams and drawings which provide specific data for the job described.

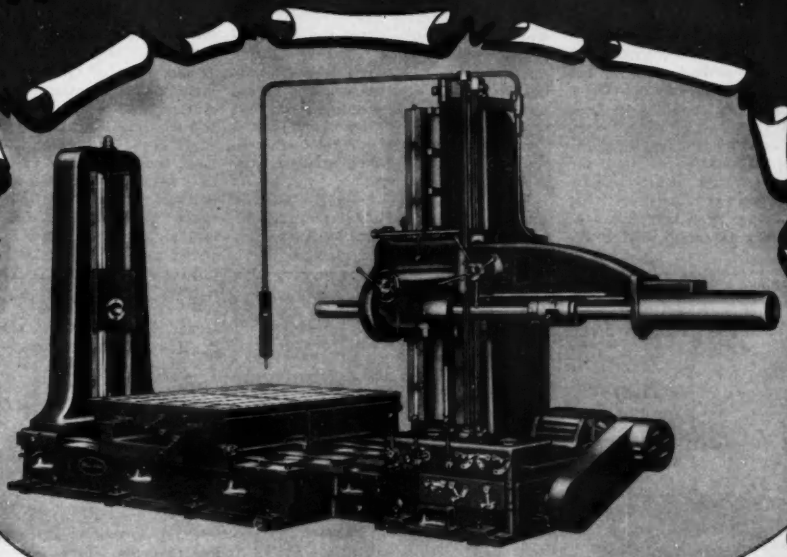
SYMPOSIUM ON THE ROLE OF NON-DESTRUCTIVE TESTING IN THE ECONOMICS OF PRODUCTION, published by the *American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.* Price $2.50. The six extensive papers and pertinent discussions included in this 164-page Symposium are frankly aimed at capturing the attention of management and are intended to present unbiased views explaining the actual or potential values of the various well-recognized methods of non-destructive testing in promoting higher quality or more economical production.

PRODUCTION OF MOTOR VEHICLES, by *Henry M. Cunningham* and *William F. Sherman*, published by *McGraw-Hill Book Co., 330 West 42nd Street, New York 18, N. Y.* Price $3.50. Containing material on managerial techniques in planning, scheduling, and manufacturing, the book was written expressly for the Industrial College of the Armed Forces. It studies the steps required to plan and to bring into production a new model automobile or truck. More than ample illustrations are provided to help in understanding the text material.

METALWORKING LUBRICANTS, by *E. L. H. Bastian*, published by *McGraw-Hill Book Co., 330 West 42nd Street, New York 18, N. Y.* Price $6.00. This book furnishes practical know-how on the nature and formulations of metalworking lubricants, the properties affecting their performance in specific operations, their proper use in the plant, and the means of maintaining top efficiency of these lubricants under operating conditions. Charts, tables, and illustrations are provided.

PHYSICAL CONSTANTS OF HYDROCARBONS BOILING BELOW 350 F, published by the *American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.* Price $1.00. This extensive compilation of tables includes most of the physical constants of hydrocarbons (boiling below 350 F) which would be valuable to testing engineers and others concerned with the natural gasoline, synthetic rubber, industrial aromatics, and gaseous fuels industries. Six classes of hydrocarbons are covered in the tables, including paraffins, mono-olefins, di-olefins, acetylenes and naphthenes, and aromatics.

NOW—4 WAY Bed Construction



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In addition to the Bullard 4-way bed construction, other design improvements such as protected bed-ways, non-metallic bearing surfaces under table and saddle, and adjustable nuts for table and saddle feed screws are a few of the improvements that place these 4" and 5" spindle machines on your list for investigation.

Furthermore, don't forget—convenient right hand operation, safety features and hydrodynamic drive.

Write Bullard for other details

THE BULLARD COMPANY

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More Turnpikes to Handle Modern Traffic

(*Continued from page 37*)

will probably be constructed within the next few years. Ohio is currently considering a route extending from the Western end of the Pennsylvania Turnpike to the Indiana border. An Ohio resolution—HJR 22—memorializes the Interstate Commerce Commission, the Public Utilities Commission and the Director of Highways to investigate and report on the traffic problems that will confront Ohio upon completion of the Pennsylvania superhighway. It declares that completion of the Pennsylvania extension will result in greatly increased flow of traffic East and West across Ohio, and especially across routes 18 and 224. Another Ohio bill would amend the Toll Road Law to provide that locations of toll road projects shall be approved by the Legislature instead of the Governor.

West Virginia is surveying a possible 200-mile route under the jurisdiction of the West Virginia Turnpike Authority. No further details or legislation have been reported.

The State of Georgia has passed a law authorizing the Fernandina Port Authority to construct toll roads from the Georgia-Florida boundary line to St. Marys, or to any other point not more than 50 miles from the border. A bill creating the Georgia Turnpike Authority to construct and operate toll roads received no action before the legislature. The lawmaking body is recessed until January, 1952.

Virginia and North Carolina lawmakers have authorized a toll road from Virginia Beach, Va., to Naggs Head, N. C. A North Carolina bill—S. 216—would also create a Turnpike Authority consisting of five members empowered to construct and operate toll roads. The Authority would be empowered to issue bonds that do not pledge the credit of the State. It would be granted broad, discretionary powers to acquire property, fix and collect tolls and establish regulations for use of such toll roads.

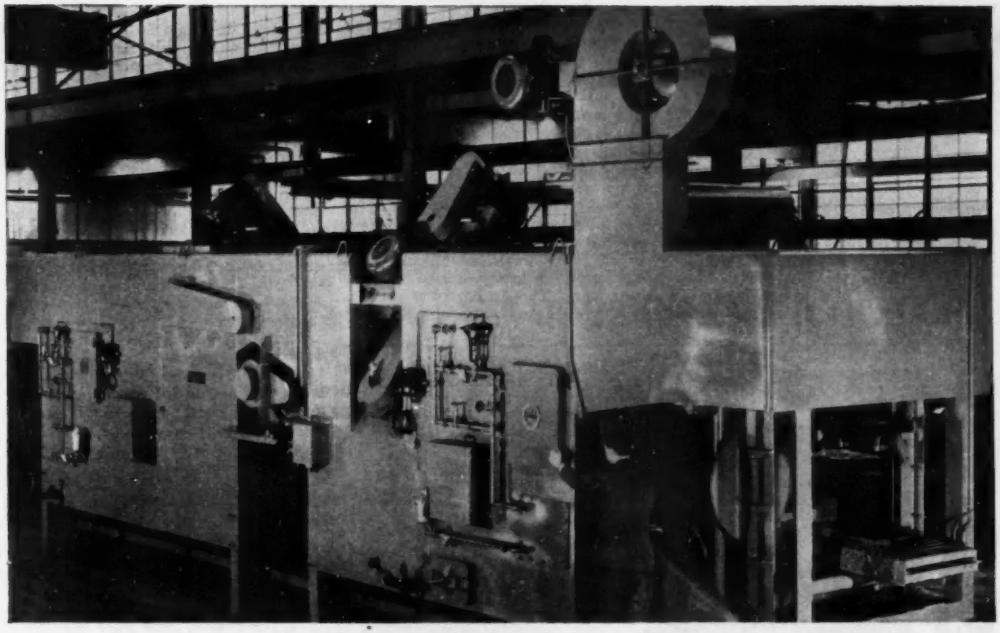
Three states, Maryland, Kentucky, and Florida, have general turnpike legislation concerning the authority to construct toll roads, but nothing definite can be established as to what action they are going to take.

Texas has placed itself in a rather unique category in comparison with other states in the enactment of toll legislation. Last year the State granted a charter to a private concern known as the Texas Turnpike Co. to build a toll road from Dallas to Houston. Although this was rather common in bygone days, it is the first concession of a modern toll-road facility, with the exception of several privately-owned short scenic roads throughout the U. S. which are of no value to the national highway system.

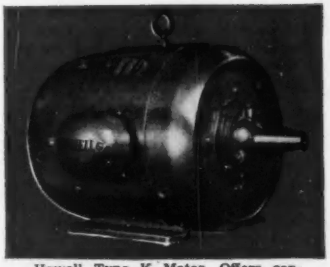
An Illinois law creates a Toll Road Commission consisting of one Senator, one Representative and one citizen from each city of over 75,000 population. This Commission will study the feasibility of establishing and maintaining a system of toll roads between principal cities connecting with the interstate trunk lines. Other Illinois bills (H. 260 and S. 106) would create a Turnpike Authority empowered to construct and operate toll roads and issue revenue bonds. The bonds would not constitute a pledge of the faith and credit of the State, but would be payable solely from the tolls pledged for their payment. The Authority would consist of three members, appointed by the Governor, with broad discretionary powers to acquire property, build toll roads, fix and collect tolls.

Several other states not mentioned previously have also considered the

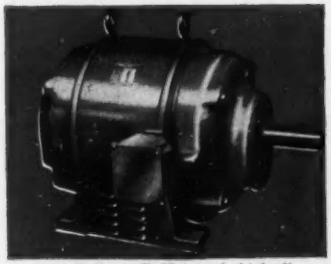
(*Turn to page 98, please*)



How to give a cylinder block a clean start



Howell Type K Motor. Offers constant performance in the presence of dirt, dust, fumes and moisture. Sizes 3 to 150 H.P. at 1800 R.P.M. Either vertical or horizontal mounting.



Howell Type F Motor. A high-slip, high-torque motor designed for punching and shearing operations. Sizes ½ to 200 H.P. in open frames; ½ to 125 H.P. in enclosed frames.

This new Centri-Spray washer thoroughly cleans up to 400 cylinder blocks an hour. It often runs 3 shifts a day, six days a week. A tough job for the nine Howell Industrial Motors which power it!

Four 25-H.P. motors operate the unique Centri-Spray units which envelop the rotating blocks with a powerful high-volume spray of water. A high-head centrifugal pump, equipped with a 15-H.P. motor, flushes blocks internally. All foreign matter is *completely removed*, inside and out. Four motors, from 1/3 to 20 H.P., power the automatic sludge remover, the recirculating pump, the main conveyor and the high-pressure blowoff fan.

Howell engineers worked closely with this manufacturer to provide the *right* motor for each application. As a result, this Howell-powered washer easily takes the hardest operating schedule in stride.

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HOWELL Red Band MOTORS

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high-speed toll road problem, and some have abandoned the project at least for the present. But rather than deal with past proposed bills, it is of interest to present a brief digest of current legislation that is pending the enactment of various State law-making bodies.

In Arkansas, Bill H. 446 would authorize the State Highway Commission to construct and improve roads and bridges and collect tolls and other charges for the purpose of funding bonds issued by the Commission. Issued bonds would constitute obligations of the Commission payable solely from revenues.

Bill S. 441, California, authorizes bridges and highway districts to construct, acquire and operate toll roads connecting with any toll bridge owned by it. Such district is permitted also to issue revenue bonds to finance the cost of the acquisition of toll roads.

A Michigan resolution (HCR-30) would create a joint interim committee to consider the feasibility of constructing toll roads linking Detroit with Toledo and Chicago, and the building of such other toll roads as may prove beneficial to Michigan. Another Michigan bill, S. 47, would establish a Turnpike Authority in the State Highway Department. The Authority would consist of three members appointed by the Governor. It would be given power to construct and operate toll roads, collect tolls, acquire property and issue bonds that would not constitute a debt of the State.

The last piece of current state legislation comes from Wisconsin. Bill S. 184 would create a Wisconsin Turnpike Authority consisting of four members to be appointed by the Governor. The Authority would have vested in it the right of eminent domain, and power to construct and operate toll roads. It would also be empowered to fix and revise tolls, and relocate public highways. Authorized bonds would not pledge the credit of the State.

The toll road movement has caused widespread interest throughout the United States, and is the basis for much pro and con discussion. As this article points out, much has been and is being done to provide modern high speed expressways. Far more remains to be accomplished to make possible fast, comfortable, long-distance motor vehicle travel.

Publications Available

(*Continued from page 60*)

on cut-wire shot for cleaning and peening.

A-153 Thread Inserts

Heli-Coil Corp.—A new 16-page two-color bulletin covering design data on helical-wire thread inserts and the use of these inserts in the protection and repair of tapped holes is now offered.

A-154 Switches

Micro Switch Div., Minneapolis-Honeywell Regulator Co.—Recently issued is a new catalog, No. 72, covering that part of the company's line of switches that are especially designed for aircraft, mobile, marine, railway, and other low voltage direct current applications.

A-155 Plastics

Bakelite Co., Div. Union Carbide and Carbon Corp.—Volume 23, Number 1 of the Bakelite Review contains one article on reinforced plastics and another on the use of plastics for low tension ignition systems.

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AN 940	AN 970	NAS 143C	BEC X 4	BEB X 3
AN 945	AN 975	BEC X 1	BEE X 1	BEB X 8
AN 950	AN 8013	BEC X 2	BEB X 1	BED X 1
AN 955	NAS 70	BEC X 3	BEB X 1.1	SC 104-1
AN 960		AN 122576 thru 122600		

WRITE FOR NEW FOLDER OF SPECIFICATIONS FOR ARMED FORCES WASHERS

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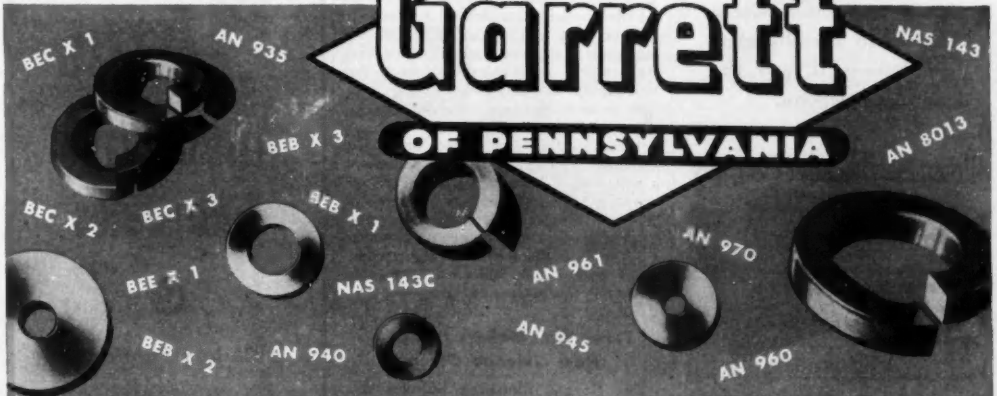


GEORGE K. GARRETT COMPANY, INC. • PHILADELPHIA 34, PA.

MANUFACTURERS OF

STAMPINGS • LOCK WASHERS • FLAT WASHERS • SPRINGS • HOSE CLAMPS

Simplified Design Reduces Soldering

(*Continued from page* 48)

at the rear fender. As a matter of fact, the joint at the rear window corner is extremely narrow owing to the wrap-around rear window construction and soldering has been entirely eliminated by localizing the weld within an area that is completely covered by the window molding.

The welded joint at the rear nose of the rear fender eliminates the need for soldering through the use of the inert-gas shielded arc welding technique. Lansing Fisher Body now is using the latest type 400-amp selenium rectifier welders with argon gas. This is said to produce an excellent weld, stronger than the parent metal, and filling so well as to require no further operations save grinding and polishing on the body-in-white line.

Moreover, the rectifier equipment now assures a stable arc under all conditions, thus making it possible to produce welds of uniform quality.

The illustrations shown here give a sampling of a few of the new operations in the fabrication of the body. Here will be seen the balloon fixture in which the rear quarter panels and roof panel are joined into an integral subassembly. The inert-gas shielded arc welding mentioned above, as well as the gas welding shown in the illustration, is done in this fixture.

Special Machine Grinds and Polishes

(*Continued from page* 53)

hard wheels used in this machine require no dressing at any time. There is provision, however, of steel brushes which contact the wheel surface to remove dust and chips. Each of the machines is equipped with the familiar Barnes-dril magnetic separator for thoroughly cleaning the cutting fluid, thus promoting optimum conditions for an excellent surface finish.

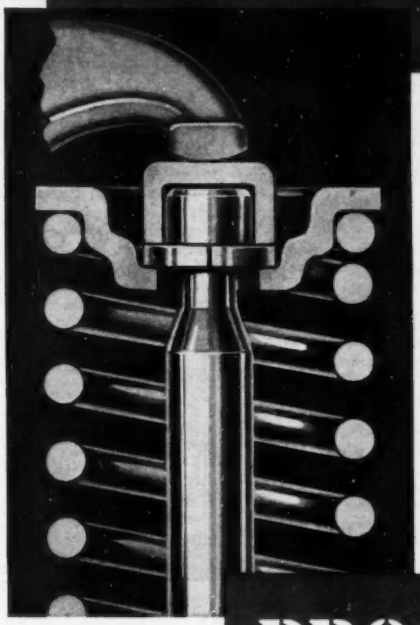
In addition to fine surface finish, the machine is designed to hold runout to a range of 0.0003 to 0.0004 in. Each machine has a productivity in excess of 1000 pieces an hour at maximum capacity and efficiency. This technique marks a large improvement over the productivity and quality obtained from conventional equipment.

Three Tool Makers to Open New Chicago Office

The Bryant Chucking Grinder Co., Fellows Gear Shaper Co., and Jones & Lamson Machine Co., all of Vermont, will open a new office and showroom, to be occupied jointly by them, in Chicago about June 1.

The Eaton Free Valve

—Naturally Better



Three main causes of valve failure are traceable to:

- **Valve Stem Deposits**
- **Valve Seat Deposits**
- **Restricted Lateral Movement**

The Eaton Free Valve is free to move of its *natural* tendency. This complete freedom permits natural circumferential creep and lateral movement. These, in turn, wipe away stem and seat deposits and protect the valve from local overheating.

PROOF

The Eaton Free Valve Principle:

Extends Valve Life

Maintains Fuel Economy and Engine Performance

Eaton engineers will welcome an opportunity to discuss the application of Eaton Free Valves to engines proposed or now in design.

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CLEVELAND, OHIO

VALVE DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

Air Force Needs Fast Fire Trucks

(*Continued from page* 39)

crash fire fighting under world-wide conditions. So drastic were some of the changes being introduced that World War II "Class" numbers were discontinued. These were replaced with "Type" designations.

One of the new experimental models was the Type O-8. It was to take the place of the Class 155 truck. The foundation of the O-8 became a six-ton 6x6 Kenworth chassis employing a Hall Scott Model 400 engine developing 312 hp. A Hale ZEYMHD high pressure water pump was mounted in the forward part of the chassis. The body and fittings are aluminum.

The O-8 has a gross weight of 36,000 lb but its flotation characteristic is so greatly improved over the 155 that instead of weighing 90 lb per sq in., the O-8 has been brought down to 35 lb. It has a 212-in. wheelbase and an overall length of 31 ft. It carries two 50-gal foam tanks and two water tanks with a total capacity of 1000 gal. It also has a capacity for 200 lb of CO_2 in a high pressure system.

The five-man cab is enclosed behind double windows with a circulating air space between the panes. The glass is heat resistant and is equipped with de-icing and de-fogging mechanisms. There is thermostatic control of heat inside the body to compensate for both arctic and torrid conditions.

The 155 had been criticised for its inability to move forward and consolidate gains made against a blaze, so the twin turrets of the O-8 were placed on the front fenders. The operators, for protection against sub-zero blasts, were placed inside the cab where they can handle the direction and flow of the turrets by a compact set of remote hydraulic controls.

To aid fire-fighting mobility, the high pressure pump was designed in such a fashion that it can be engaged while the vehicle is traveling at speeds upwards of 40 mph. The pump can operate at full capacity while the O-8 is moving forward or backward at five mph.

Each of the turrets contains four different nozzles which can be brought into play as the situation demands. There are separate nozzles for straight stream, fog, foam and sno-foam. In addition, two ground sweep nozzles project beneath the front bumper and two of handlines lie coiled within the aluminum sides of the vehicle.

The O-8 is the first of the all-weather crash trucks. This means the apparatus must be fully operational at −65F in a 20-knot wind; the windshield must be defrosted; temperature of the oil and engine block must remain above zero; the pumps, valves, lines, nozzles and agents must be above freezing; and the battery must remain fully charged.

(*Turn to page* 104, *please*)

NEW PRODUCTS

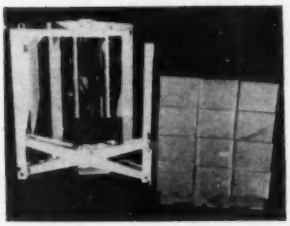
For additional information please use coupon on page 60

(*Continued from page* 77)

C-129—Sideloading Fork Truck

Complete fork truck operation in 6-ft aisles—half the previous width—is now declared possible with the new Sideloader attachment for fork trucks revealed by Automatic Transportation Co., Chicago, Ill.

The device permits a fork truck parked longitudinally in the aisle to stack to either side without having to turn at right angles to the aisle. Instead of the truck making the 90-deg turn, the forks do it while the truck remains stationary.



Automatic Sideloader fork truck

Operation of the Sideloader consists of two motions. A rotary action turns the forks to either right or left, and a scissors type of expanding motion then pushes the forks out as much as 54 in. In use, a Sideloader truck parks adjacent to the spot where it is to stack its load. The driven turns the forks to the desired side, then uses the scissors (in and out) motion to position the pallet of merchandise. Lifting procedure follows the standard method, after which the forks are retracted and straightened, and the truck moves on to its next assignment.

The unit illustrated can handle pallet loads weighing up to 2500 lb and measuring as large as 48 by 48 in. It is mounted on an Automatic Skylift electric truck with a capacity of 4000 lb.

The arrangement is operated by the truck's hydraulic system, governed with a single handle controller equipped with a push button near the top. The handle is turned right or left to turn the forks. The button is pushed to start or stop the in-out movement.

A system of electrical interlocks protects against automatically extending the load forward before the forks are turned to the side. This prevents the load from exceeding the in.-lb capacity of the truck.

How many lives is a dollar worth?

The cost of a machine, fixture or broach is no gage of how well they will work together and produce together in any broaching installation—and in no process is proper relationship of tools, fixtures, and machines more vital than in broaching.

The wrong broach, fixture or machine always costs MORE.

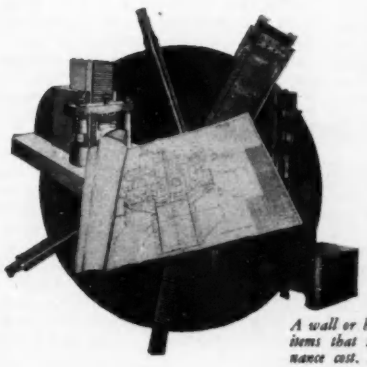
That cost, today, is measured not only in waste of time and money but potentially also *in American lives.*

The time is now. The place—wherever broaching is being adopted to produce more goods—faster . . . with the minimum of precious manpower . . . with the minimum of shut-downs.

To do that, broaching equipment—machine, fixtures, broaches—must be designed, integrated and built to do the job "right the first time."

That's why Colonial is ready and willing to check over your broaching layouts and recommend such changes as appear desirable on the basis of its vast experience with practically every conceivable type of broaching installation.

It costs you nothing. Have Colonial's specialists check broaching equipment or tooling before you release that order.



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FOR YOUR TOOL ROOM

A wall or bulletin board poster of DO and DON'T items that should help you reduce broach maintenance cost. No charge. Ask for BN-1250.

A 110-v, a-c engine generator unit in the Type O-8 powers heating units in the engine block, oil pan and tanks. When the apparatus is garaged and the engine stopped, the generator unit is plugged into the garage lighting circuit and operates without placing any demands on the battery system. The moment the apparatus goes into use, it pulls loose from the lighting circuit and automatically switches over to draw heat and power from the engine.

Two other pieces of apparatus also were developed by the Air Force in its war against fire. One is the Type O-7 tanker, which is similar to the O-8 except that it lacks any means of applying the quenching agents. The O-7 serves merely as a mobile auxiliary supply of water and foam.

The Type O-6 is a new truck common to most Air Force bases. It has a capacity of two tons of CO_2 and 150 gal of water. There is an oscillating sweep under the forward bumper and a pair of CO_2 handlines with 22 lb nozzles. It, too, is winterized and has most of the frost-, fog-, and temperature-control features employed in the O-8. The chassis was built by Sterling Motors and the body and equipment by Cardox.

In addition, the O-6 utilizes an experimental inflation - deflation device whereby the driver can change tire pressure while the apparatus is in motion.

Early last fall, specialists at the Air Proving Ground finished a new series of eight carefully planned test fires in which the three new trucks, O-6, O-7, and O-8, had been thoroughly tested. The following were their conclusions: (1) With some revisions, the O-6 will be an improvement over present CO_2 trucks for crash fire fighting. (2) There is no apparent requirement for such a tanker as the O-7 in crash fire fighting. An additional crash truck of the same capacity as the tanker is much more versatile in use and can be purchased for small additional cost. (3) The O-8 crash truck is an improvement over the present standard crash fire trucks. However, it leaves much to be desired for an ideal vehicle.

The test specialists added a fourth observation which, in a sense, was a qualification of the other three: "A higher degree of equipment effectiveness," they said, "could have been derived by increasing the proficiency of the crash fire-fighting crews." In other words, the new apparatus contained advantages that would not be evident until firemen become thoroughly experienced in using it.

As a result of the most recent tests, specific recommendations were made, three of which were designed to increase the rate of applying agent onto the blaze: First, the foam handline flow should be upped from 30 to 60 gpm or as much more as one man can handle; the CO_2 handlines should increase their flow to 750 lb per minute or more; finally, the turret sno-foam nozzle should be reworked to produce a narrower, more concentrated pattern. They found that additional work was required on the turrets of the O-8 to eliminate a certain tendency to drift during hands-off operation. On the O-6, there are some deficiencies in the ground-sweep nozzle. Additional tests are being planned to determine the best flow rate, oscillating rate and angle of discharge.

One thing becomes increasingly evident from the recent test report. The Air Force has yet failed to determine the one best size and the one best capacity and composition for a standardized crash fire truck. This standard vehicle is something of an ideal without shape or form. It's entirely possible that the unique problems of fire fighting may continue to resist any sort of standardization. Perhaps it is even impracticable to develop a single truck that will handle crash fires in both jet fighters and globe-circling bombers. Only future study and experience will present the answer.

On other matters, however, the test crews could make pointed recommendations, some favorable, some not so favorable. They stated, for example, that the over-all body design of present crash fire trucks is bad. The long hoods become an obstacle to the driver's vision, and this is especially serious in the case of the O-6 and O-8 where the vehicles are equipped with forward ground sweeps.

This is a definite weakness and engineers now recommend shifting the cab forward directly over the engine. In the design stage at present is a Type O-10 truck which will embody this principle of cab-over-engine. In other respects it will be similar to the O-8.

Experiments now have ample proof that the greatest quenching power per lb or gal of agent can be gained through a handline in the grip of a skilled fireman. In keeping with the increased importance of the handlines, they are trying to increase the handline's range of action.

Japanese Nissan Company Builds 2900 Trucks for Army

The Nissan Motor Co., Ltd., Shinkoyasu, Yokohama, Japan, has already delivered more than 2900 motor trucks to the U. S. Army. A further contract for cargo trucks and dump trucks has been awarded to Nissan by the Japan Logistical Command and the National Police Reserve (Japanese Army) for approximately 2000 units for the March-June period. Nissan is one of the largest automobile manufacturers in Japan. Organized in 1933, it first made the small-sized "Datsun" automobile, and started production of the standard-sized Nissan in 1937. The company has about 7000 employees at present. Monthly production currently amounts to 1100 units in the standard-sized model and 600 units in the small-sized model.

Switching to TIMKEN® tubing saved 14% on this part!

THE cost of this automotive part was $150.90 per thousand when made from bar stock. When the manufacturer switched to Timken® seamless tubing, he was able to use boring tools in place of twist drills and to increase speed and feeds. This resulted in producing 144 pieces per hour instead of only 96, with the savings shown here:

COST FIGURES TELL THE STORY

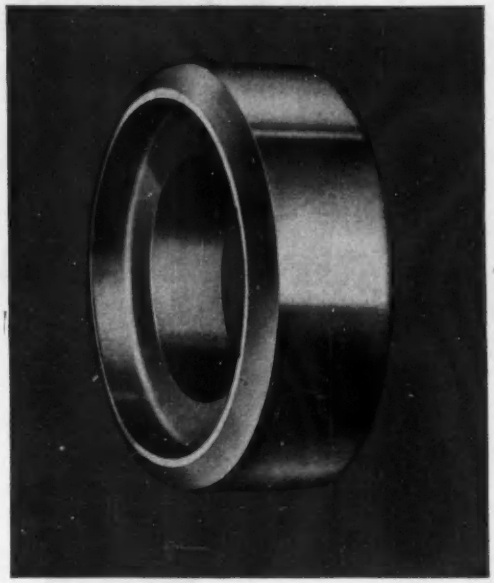
	BAR STOCK	TIMKEN TUBING
Material cost per 1000 pieces . . .	$ 83.19	$ 84.71*
Machining cost per 1000 pieces (6 spindle 2⅝" capacity automatic screw machine with estimated operating cost of $6.50 per hour)	$ 67.71	$ 45.14
TOTAL COST . . .	$150.90	$129.85

Total with bar stock. . . . $150.90

Total with Timken tubing . $129.85

SAVING . . . . . $ 21.05 (14%)

*In most cases, Timken seamless tubing is lower in cost than bar stock, foot for foot. In this instance, it was slightly higher because of the extremely great wall thickness.



If you make a hollow cylindrical part, chances are you can save anywhere from 10 to 35% by switching from bar stock to Timken seamless tubing. Timken tubing eliminates drilling because the hole is already there. Finish boring is often your first production step. You have less stock to machine—less scrap loss. Machining cycles can be shorter, speeds and feeds increased.

And since the piercing process by which Timken seamless tubing is made is basically a forging operation, you get fine forged quality in your hollow parts. From tube to tube, and from heat to heat this fine forged quality is always uniform because of our rigid quality control.

USE OUR TUBE ENGINEERING SERVICE

Our Tube Engineering Service helps you select the most economical tube size for your job, guaranteed to clean up. With the tube we specify, you waste no time or material machining away excessive stock. Yet, you're sure of enough metal to fill out your dimensions. For an analysis of your requirements, write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

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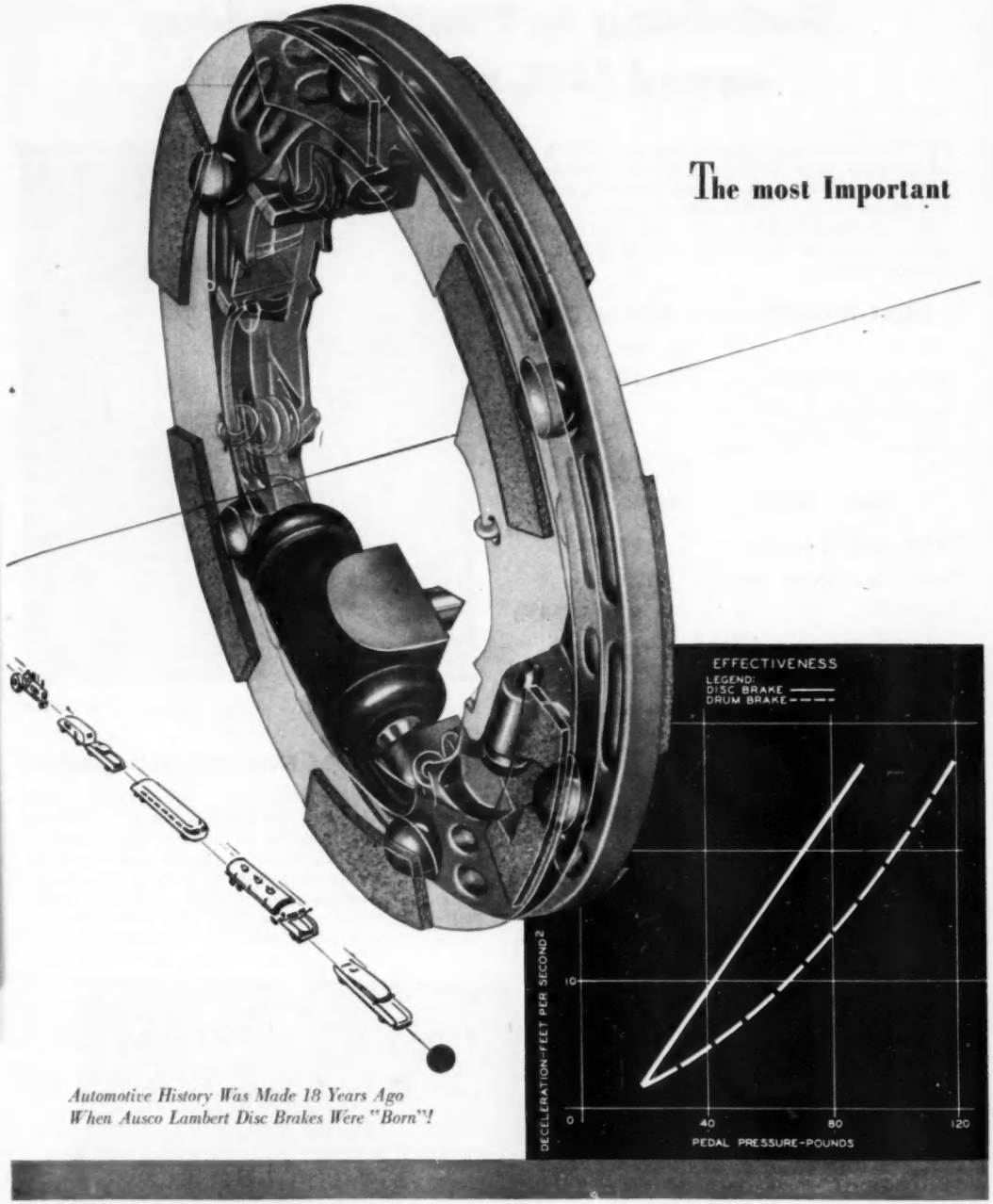

Automotive History Was Made 18 Years Ago When Ausco Lambert Disc Brakes Were "Born"!

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The fundamental operating difference in these disc brakes results from Ausco Lambert's controlled self-energizing action which utilizes the momentum of the vehicle to furnish the greatest part of the braking power, so that only a very slight pedal pressure is required from the operator. This self-energized braking, as the above graph shows, operates in a straight line function with the foot pedal pressure, bringing the vehicle to a positive stop, smoothly and safely.

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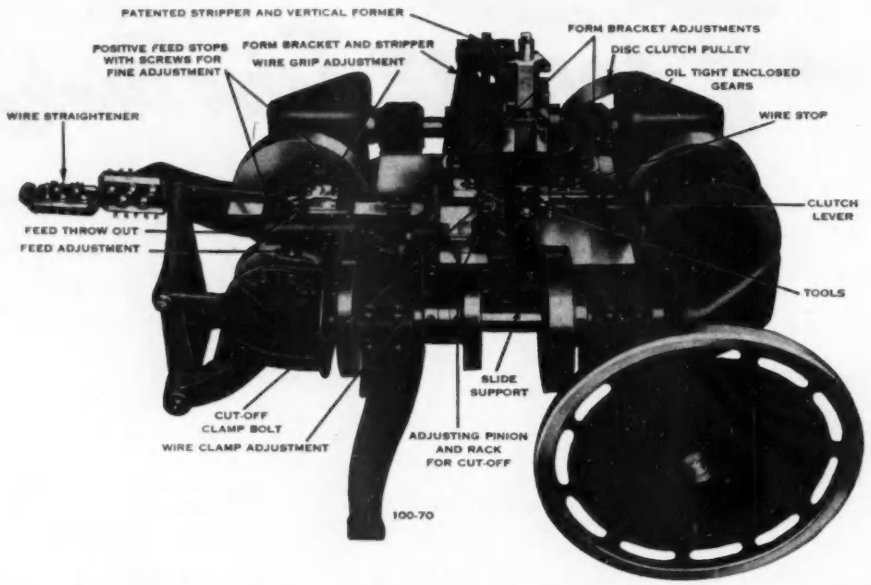

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USES: Attaching and sealing weather strips on doors, trunk lids, cowl ventilators. Sealing leaks around windshields, windows, top fabric, small body cracks. EC-226 is also used to attach rubber mats on running boards, floors, pedals.

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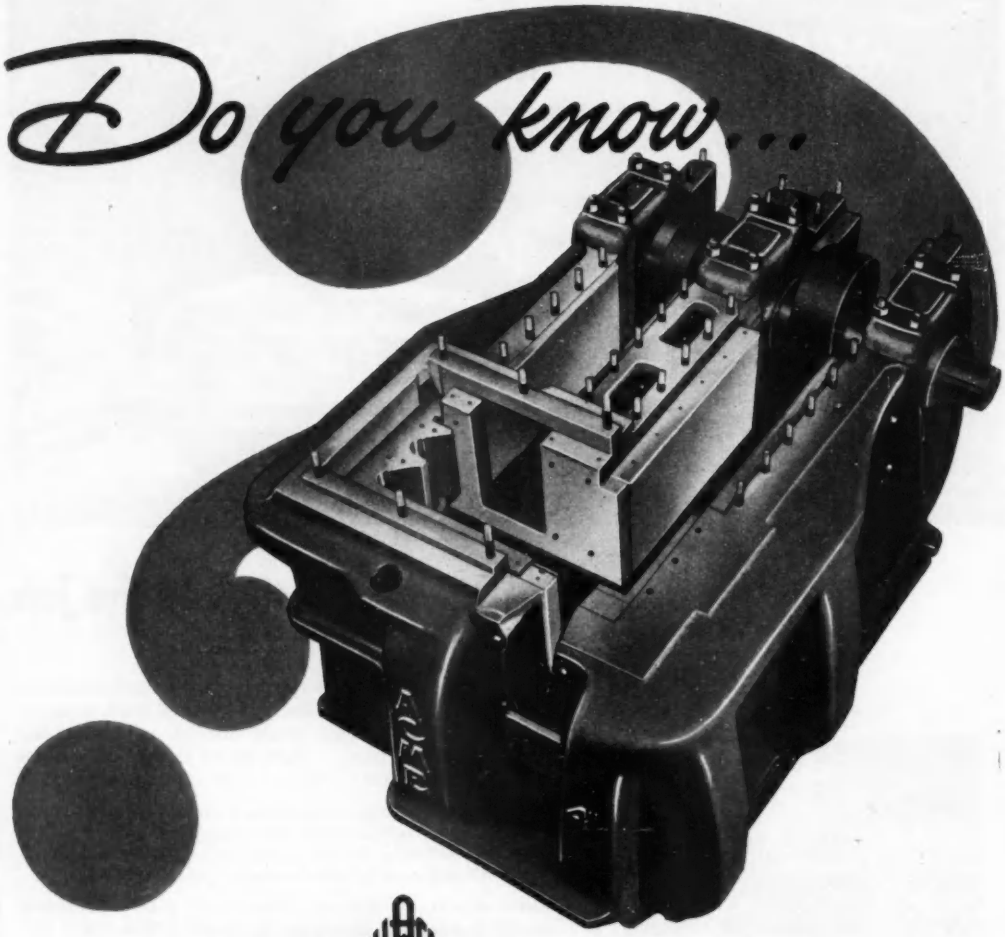

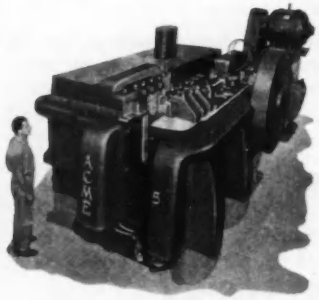

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The 9DBW-28A sets a new standard for drill performance. It was accepted as standard by one of the nations largest aircraft manufacturers after exhaustive tests, and it cuts production costs wherever it is used.

But this tool is only one of a complete line of Cleco Air Tools. Call, write or wire one of the offices listed below and a Cleco Field Engineer will be glad to help you solve some of your production problems.

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R. P. M.	2800
Weight	2½ Lbs.
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Straight handle optional.
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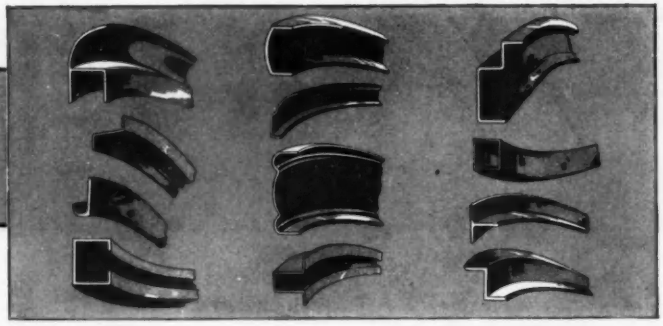

Trailer roof cap (left), formerly an assembled section, is formed in one piece by BATH. Coach frame (right), includes reverse bends.

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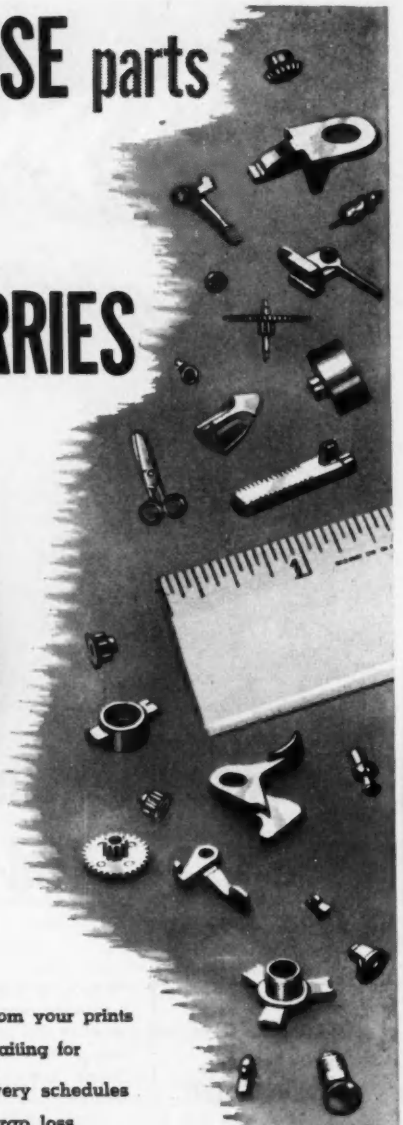

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Contains full information, certified as laboratory tested and proved, on the physical properties and characteristics of DEWARD Tool Steel, and best methods of handling and treatment. *Send for your copy.*

ADDRESS DEPT. AI-18

Wherever your specifications call for hardened machine parts in precision work, you'll gain greatest advantage by using DEWARD Oil-Hardening Tool Steel—famous for its freedom from distortion after heat treatment.

This quality caused the selection of DEWARD for the complete set of precision gears illustrated above, which must run absolutely true in operation. After grinding, the gears are heat treated at 1425-1500° F., oil-quenched and then drawn at 750° F., resulting in a hardness of 48-51 Rockwell C. With no distortion, the final regrind and lapping of the bolt before assembly becomes a simple, quick, low-cost operation.

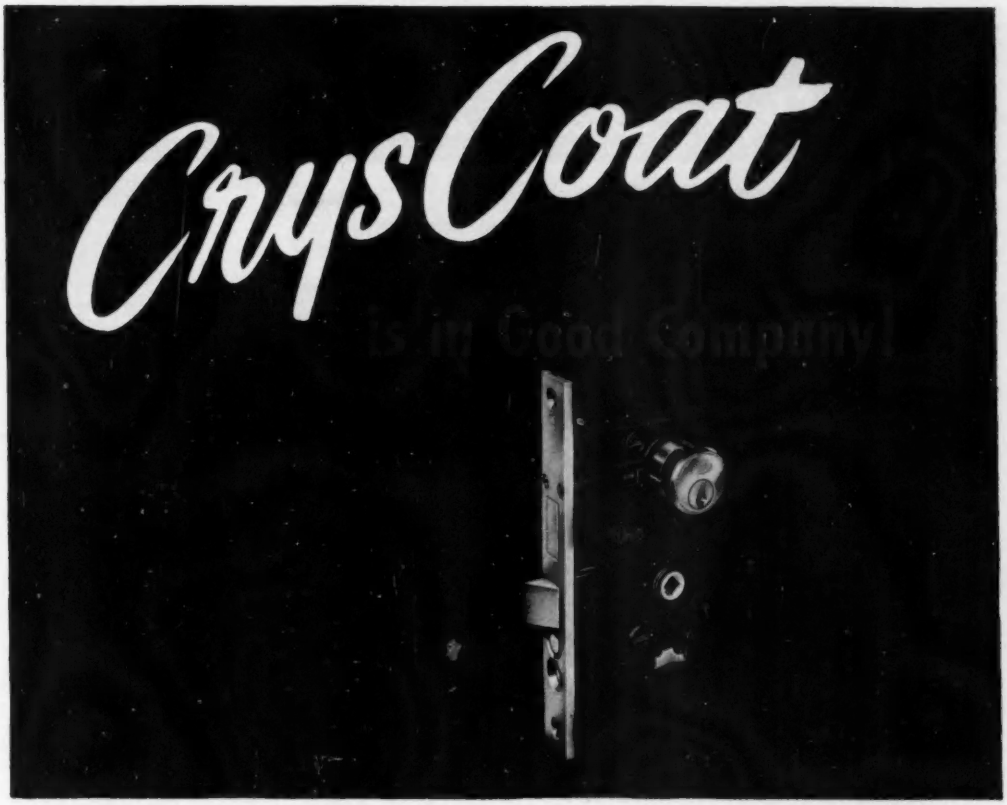
For any jobs of this general nature, let us show you how DEWARD can save you time and money in production, give you a better finished job—*or both!* Our Mill Service Staff is at your command, without obligation. ● *Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.*

For complete **MODERN** Tooling, call

Allegheny Ludlum

W&D 3487

AL FINE TOOL STEELS SINCE 1854



*Prepares Metal Surfaces for Painting

*Patented Material and Process

THE name CORBIN on a lock stands for unsurpassed excellence in hardware crafting and rugged construction. To Oakite *CrysCoat* is entrusted the important task of protecting the lock mechanism and case against those invading elements that cause corrosion and mechanical breakdown.

The Oakite *CrysCoat* Process may be just what you're looking for. With minimum equipment . . . in minimum time . . . at minimum cost you can (1) clean metal surfaces and condition them for painting; (2) improve the adhesion of paint to metal; (3) prevent corrosion before metal is painted; (4) localize corrosion under paint if finish is broken.

The Oakite *CrysCoat* Process Offers These Extras:

1. **Eliminates operations . . . uses less equipment**
2. **Cuts operating time**
3. **Uses less chemicals for cleaning and conditioning**
4. **Reduces heating costs**
5. **Saves cost of expensive acid-proof tanks and equipment**
6. **Saves cost of frequent descaling and desludging**
7. **Drag-out costs are less because of low original cost of solution**
8. **Saves paint**
9. **Cuts cost of rejects caused by rusting before painting**

FREE . . . illustrated folder describes the Oakite *CrysCoat* Process for use in before-paint-treatment of steel, aluminum sheet and castings, zinc die castings and galvanized surfaces. If you are engaged in the fabrication of civilian goods or the speedy production of defense orders—send for Folder F7642.

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Are You Ordering Higher Alloy Grades Than Necessary for Your Defense Orders?

Many of the high-priority defense orders now being submitted by manufacturers of essential equipment call for steels considerably richer in alloy content than is necessary.

Such practice is wasteful. It wastes nickel, molybdenum and other alloying elements that are in short supply throughout the nation.

Here is an example. Bethlehem recently received an approved order for 4340 nickel-chromium-molybdenum steel, aircraft-quality, in a small size presumably for aircraft-engine parts. After Bethlehem metallurgists looked into the situation it developed that this steel was actually intended for making brackets that hold together the crates in which aircraft engines are shipped. It was obvious that ordinary carbon steel would serve the purpose, and our metallurgists recommended the use of 1045 grade, which was finally accepted.

Generally speaking, unless special properties such as heat-resistance or corrosion-resistance are required, there is no advantage in using steels with more alloy content than the minimum needed to make the piece quench out properly. Over-alloying will only serve to increase the sensitivity of the steel to quenching cracks. If you have any questions, particularly on conservation of the alloy steels needed for defense purposes, call or write for metallurgical advice.

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BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
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BETHLEHEM ALLOY STEELS

BETHLEHEM STEEL

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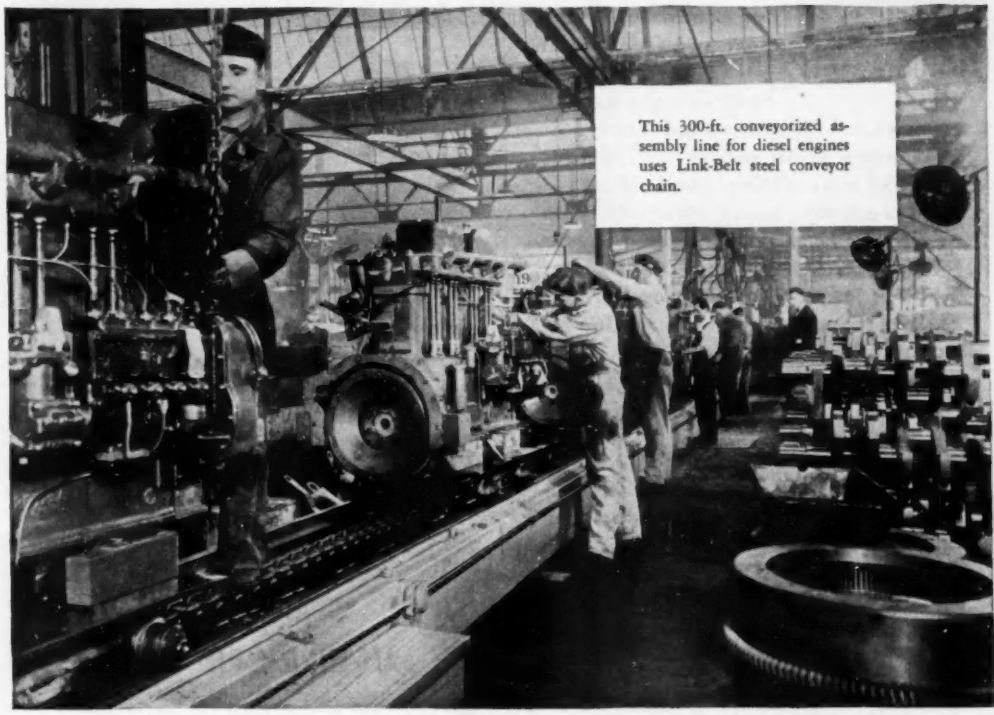
LINK-BELT makes all types of chains



This 300-ft. conveyorized assembly line for diesel engines uses Link-Belt steel conveyor chain.

...recommends the right one for your job

Typical chains from the complete Link-Belt line

Class H Pintle chain—excellent for conveyors that slide, used plain or with attachments.

Class C combination chain—popular, durable, low cost design for elevators, conveyors.

Class SS bushed roller chain with offset sidebars—for heavy drive service at moderate speeds.

Link-Belt "Flint-Rim" cast sprockets, give extra long life. Cast steel sprockets are also available for most severe service.

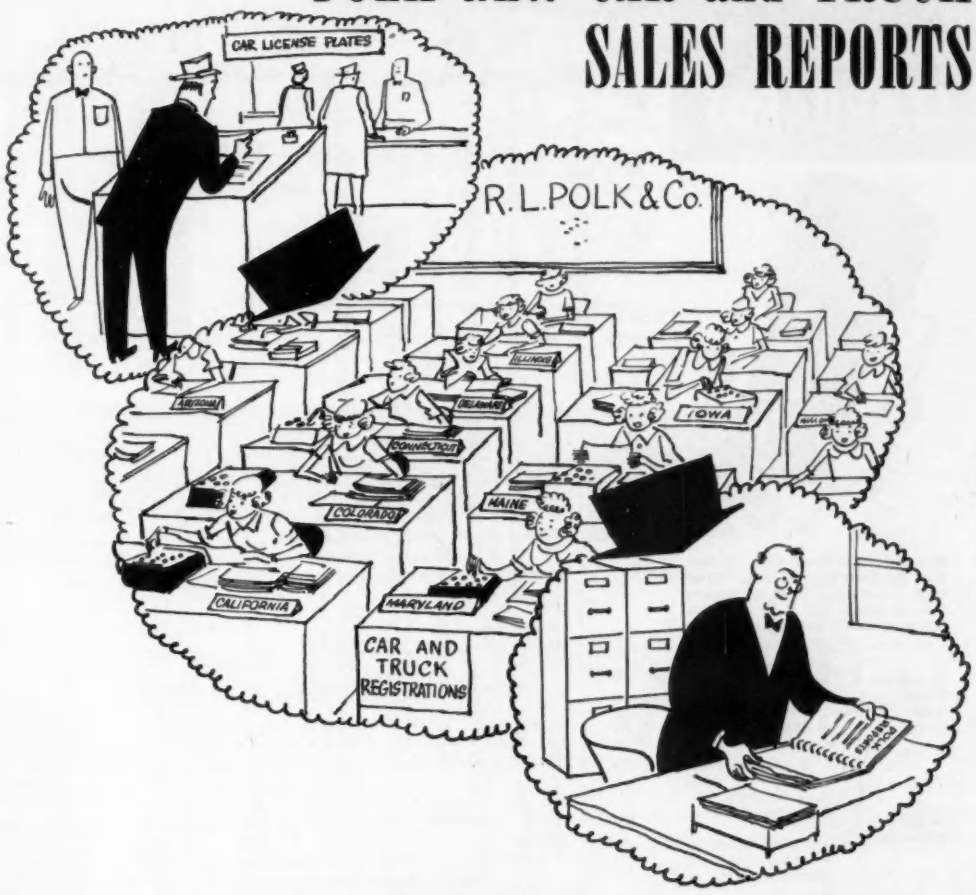
More than strength—more than length—all operating qualities are taken into consideration by Link-Belt engineers when they recommend a chain for your job. From the world's most complete line of chains, they can select the *right type* to meet your specific requirements—large or small. Link-Belt builds them all. And all are built to the highest standards. Exact control of materials and manufacturing processes is your assurance of longer chain life. 12.237-D

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal Cities.

LINK-BELT

CHAINS AND SPROCKETS

POLK NEW CAR and TRUCK SALES REPORTS



Linking Sales and Manufacturing Statistics

Know **how many** new cars are being sold each month—**where**—and **when.** Use facts to determine sales quotas, to gauge service potentials, to plan profitable manufacturing programs. Use POLK NEW CAR AND TRUCK SALES REPORTS, compiled from official license registrations. Now greatly expanded in usefulness, they give sales totals **by makes, by models, by states, by price classes,** compared with previous year's sales. Know... at all times... your market potentials. Write for details on this new, comprehensive service.

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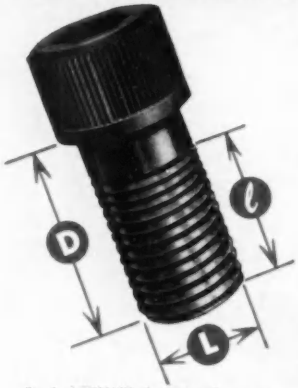

Diameter	Threads per inch NC	Threads per inch NF	Length L	Thread Length l NC	Thread Length l NF	Price per 100	Quantity per box
#4 (.112")	40		1/4	1/4		4.65	100
	40		5/16	5/16		4.70	100
	40		1/2	1/2		4.90	100
	40		5/8	5/8		5.10	100
	40		3/4	3/4		5.35	100
#5 (.125")	40		1/4	1/4		4.70	100
	40		5/16	5/16		4.75	100
	40		1/2	1/2		4.95	100
	40		5/8	5/8		5.15	100
	40		3/4	3/4		5.35	100
#6 (.138")	32	40	1/4	1/4	1/4	4.75	100
	32	40	5/16	5/16	5/16	4.80	100
	32	40	1/2	1/2	1/2	5.00	100
	32	40	5/8	5/8	5/8	5.20	100
	32	40	3/4	3/4	3/4	5.45	100
	32		7/8	7/8		5.75	100
	32		1	1		6.15	100
#8 (.164")	32		1/4	1/4		4.85	100
	32	36	5/16	5/16	5/16	4.90	100
	32	36	1/2	1/2	1/2	5.10	100
	32		5/8	5/8		5.35	100
	32	36	3/4	3/4	3/4	5.60	100
	32		7/8	7/8		5.85	100
	32		1	1		6.35	100
	32		1 1/4	1 3/16		7.10	100
	32		1 1/2	1 3/16		7.85	100
#10 (.190")	24	32	5/16	5/16	5/16	5.05	100
	24	32	1/2	1/2	1/2	5.30	100
	24	32	5/8	5/8	5/8	5.55	100
	24	32	3/4	3/4	3/4	5.80	100
	24	32	7/8	7/8	7/8	6.05	100
	24	32	1	1	1 3/16	6.55	100
	24	32	1 1/4	5/8	1 3/16	7.30	100
	24	32	1 1/2	7/8	1 3/16	8.05	100
	24	32	1 3/4	7/8	1 3/16	8.80	100
	24	32	2	1	1 3/16	9.55	100
1/4 (.250")	20	28	5/16	5/16	5/16	5.25	100
	20	28	1/2	1/2	1/2	5.50	100
	20	28	5/8	5/8	5/8	5.75	100
	20	28	3/4	3/4	3/4	6.00	100
	20	28	7/8	7/8	7/8	6.25	100
	20	28	1	1	1	6.75	100
	20	28	1 1/4	1	5/8	7.50	100
	20	28	1 1/2	1	7/8	8.25	100
	20	28	1 3/4	1	7/8	9.00	100
	20	28	2	1	7/8	9.75	100
	20	28	2 1/4	1 1/8	7/8	10.50	100
	20		2 1/2	1 1/4		11.25	100
	20		2 3/4	1 3/8		12.00	100
	20		3	1 1/2		13.50	100
5/16 (.3125")	18		5/16	5/16		6.25	100
	18	24	1/2	1/2	1/2	6.50	100
	18	24	5/8	5/8	5/8	6.75	100
	18	24	3/4	3/4	3/4	7.00	100
	18	24	7/8	7/8	7/8	7.25	100
	18	24	1	1	1	7.75	100
	18	24	1 1/8	1 1/8	1	8.50	100
	18	24	1 1/2	1 1/2	1	9.25	100
	18	24	1 3/4	1 1/2	1	10.00	100
	18	24	2	1 1/2	1	10.75	100
	18	24	2 1/4	1 1/2	1	11.50	100
	18	24	2 1/2	1 1/2	1	12.50	100
	18		2 3/4	1 3/4		13.50	100
	18		3	1 1/2		14.50	100
	18		3 1/4			16.00	100
	18		3 1/2			17.50	100
3/8 (.375")	16	24	1/2	1/2	1/2	7.40	100
	16	24	5/8	5/8	5/8	7.70	100
	16	24	3/4	3/4	3/4	8.00	100
	16	24	7/8	7/8	7/8	8.50	100
	16	24	1	1	1	9.00	100
	16	24	1 1/4	1 1/4		10.00	100
	16	24	1 1/2	1 1/2	1 1/16	11.00	100
	16	24	1 3/4	1 1/4	1 1/16	12.00	100
	16	24	2	1 1/4	1 1/16	13.00	100
	16	24	2 1/4	1 1/4	1 1/16	14.00	100
	16	24	2 1/2	1 1/4	1 1/16	15.00	50
	16		2 3/4	1 3/8		16.00	50
	16	24	3	1 1/2	1 1/4	17.50	50
	16		3 1/4	1 5/8		19.00	50
	16		3 1/2	1 3/4		20.50	50
	16		4	2		24.00	50
	16		4 1/2	2 1/4		28.00	50
	16		5	2 1/2		32.00	50
7/16 (.4375")	14		1/2	1/2		8.90	100
	14		5/8	5/8		9.20	100
	14		3/4	3/4		9.50	100
	14		7/8	7/8		10.00	100
	14	20	1	1	1	10.50	100
	14	20	1 1/4	1 1/4	1 1/4	11.50	100
	14	20	1 1/2	1 1/2	1 1/16	12.50	100
	14		1 3/4	1 5/8		13.50	100
	14	20	2	1 5/8	1 3/16	14.50	50
	14		2 1/4	1 7/8		15.50	50
	14		2 1/2	1 7/8		17.00	50

Diameter	Threads per inch NC	Threads per inch NF	Length L	Thread Length l NC	Thread Length l NF	Price per 100	Quantity per box
7/16 (.4375")	14		2 3/4	1 7/8		18.50	50
	14		3	1 1/2		20.00	50
	14		3 1/4	1 5/8		21.50	50
	14		3 1/2	1 3/4		23.00	50
	14		4	2		27.00	50
1/2 (.500")	13		1/2	1/2		10.20	100
	13		5/8	5/8		10.60	100
	13		3/4	3/4		11.00	100
	13		7/8	7/8		11.75	100
	13		1	1	1	12.25	100
	13		1 1/4	1 1/4	1 1/4	13.50	100
	13		1 1/2	1 1/2	1 1/2	14.75	100
	13		1 3/4	1 3/4	1 1/4	16.00	50
	13		2	1 1/2	1 1/4	17.25	50
	13		2 1/4	1 1/2	1 1/4	18.50	50
	13		2 1/2	1 1/2	1 1/4	20.00	50
	13		2 3/4	1 1/2		21.50	50
	13		3	1 1/2	1 1/4	23.00	50
	13		3 1/4	1 5/8		24.50	50
	13		3 1/2	1 3/4		26.00	50
	13		4	2		29.00	50
	13		4 1/2	2 1/4		32.00	50
	13		5	2 1/2		35.00	50
	13		5 1/2	2 3/4		38.00	50
	13		6	3		41.00	50
	13		6 1/2	3 1/4		44.00	50
	13		7	3 1/2		50.00	50
	13		8	4		62.00	50
5/8 (.625")	11		1	1	1	18.00	50
	11		1 1/4	1 1/4	1 1/4	19.75	50
	11		1 1/2	1 1/2	1 1/4	21.50	50
	11		1 3/4	1 3/4	1 3/4	23.25	50
	11		2	2	1 3/4	25.00	50
	11		2 1/4	1 3/4		27.00	25
	11		2 1/2	1 3/4	1 3/4	29.00	25
	11		2 3/4	1 3/4		31.00	25
	11		3	1 3/4		33.00	25
	11		3 1/4	1 3/4		35.00	25
	11		3 1/2	1 3/4		37.00	25
	11		4	2		41.00	25
	11		4 1/2	2 1/4		45.00	25
	11		5	2 1/2		49.00	25
	11		5 1/2	2 3/4		53.00	25
	11		6	3		57.00	25
	11		6 1/2	3 1/4		62.00	25
	11		7	3 1/2		70.00	25
	11		8	4		85.00	25
3/4 (.750")	10		1 1/4	1 1/4		24.00	50
	10		1 1/2	1 1/2		26.00	25
	10		1 3/4	1 3/4		28.00	25
	10		2	2		30.00	25
	10		2 1/4	2 1/4		33.00	25
	10		2 1/2	2		36.00	25
	10		2 3/4	2		39.00	25
	10		3	2		42.00	25
	10		3 1/4	2		45.00	25
	10		3 1/2	2		48.00	25
	10		4	2		53.00	25
	10		4 1/2	2 1/4		58.00	25
	10		5	2 1/2		63.00	25
	10		5 1/2	2 3/4		68.00	25
	10		6	3		73.00	25
	10		6 1/2	3 1/4		79.00	25
	10		7	3 1/2		86.00	25
	10		8	4		102.00	25
7/8 (.875")	9		2	2		47.00	25
	9		2 1/4	2 1/4		50.00	25
	9		2 1/2	2 1/2		53.00	25
	9		2 3/4	2 1/4		56.00	25
	9		3	2 1/4		60.00	25
	9		3 1/4	2 1/4		64.00	25
	9		3 1/2	2 1/4		68.00	25
	9		4	2 1/4		74.00	25
	9		4 1/2	2 1/4		81.00	25
	9		5	2 1/2		88.00	25
	9		5 1/2	2 3/4		95.00	25
	9		6	3		102.00	25
	9		6 1/2	3 1/4		111.00	25
	9		7	3 1/2		120.00	25
	9		8	4		138.00	25
1 (1.000")	8		2	2		53.00	25
	8		2 1/4	2 1/4		56.00	25
	8		2 1/2	2 1/2		60.00	25
	8		2 3/4	2 3/4		65.00	25
	8		3	2 1/2		70.00	25
	8		3 1/4	2 1/2		75.00	25
	8		3 1/2	2 1/2		80.00	25
	8		4	2 1/2		88.00	25
	8		4 1/2	2 1/2		96.00	25
	8		5	2 1/2		105.00	25
	8		5 1/2	2 3/4		114.00	25
	8		6	3		123.00	25
	8		6 1/2	3 1/4		133.00	25
	8		7	3 1/2		143.00	25
	8		8	4		167.00	25

Standard UNBRAKO thread lengths are computed from the following formulas: "**Thread length.** 1.—A screw thread is measured from the extreme point to the last usable thread and shall be as follows:

For American National coarse.
- $\ell = 2D + \frac{1}{2}$ in. (where this length of thread would be greater than half the screw length).
- $\ell = \frac{1}{2}L$ (where this length of thread would be greater than $2D + \frac{1}{2}$ in.).

For American National fine.
- $\ell = 1\frac{1}{2}D + \frac{1}{2}$ in. (where this length of thread would be greater than three-eighths the screw length).
- $\ell = \frac{3}{8}L$ (where this length of thread would be greater than $1\frac{1}{2}D + \frac{1}{2}$ in.).

Screws too short to allow application of these formulas shall be threaded as close to the head as practicable."

(Quoted from National Bureau of Standards Handbook H-28)

★ **One of a series listing *Standard* UNBRAKO Socket Screw Products sold by your local UNBRAKO Distributor. If you want reprints of this and other advertisements in the series, ask for them on your business letterhead.**

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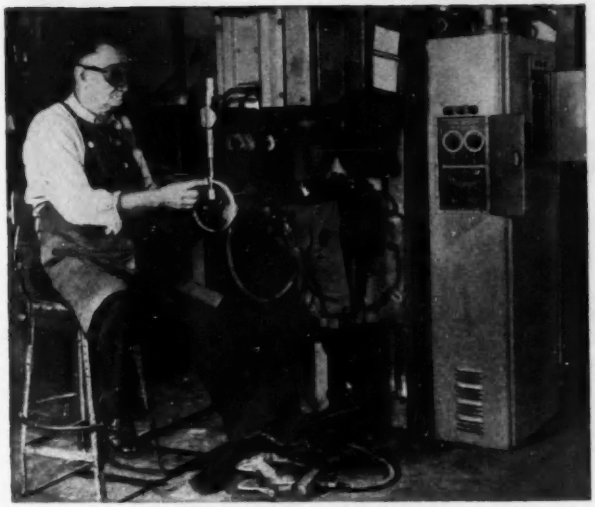
Solar Aircraft Welds Close to the Edge



Material does not split out, spattering is reduced on this jet engine part because G-E slope control permits a gradual increase in welding current that also reduces tip pick-up and spatter. More welds can be made before electrodes must be cleaned. Welds are sound and uniform. Bulletin GEC-534.

G-E Slope Control for Resistance Welding Prevents Split-outs on Stainless Steel Jet Engine Parts

More precise work possible with this resistance welding accessory used with G-E synchronous control.

Be sure of consistent, high-quality welds with these G-E Accessories

DETERMINE THE BEST TIMING FOR A JOB **Portable, inkless G-E cycle recorder makes a record of the exact timing on test welds, is then used as a check to verify the setting on machines in production. Bulletin GEC-376.**

HOLD WELDING CURRENT CONSTANT **Regardless of line-voltage variations of as much as plus 10 per cent and minus 20 per cent, the G-E electronic voltage-regulating compensator holds welding current constant. Bulletin GEA-4223.**

REDUCE BRITTLENESS **Heat treat medium-carbon, low-alloy, or high-alloy steel with G-E tempering control. Easily installed and operated. Adjustable to suit thickness and type of metal welded. Bulletin GEA-4201.**

MEASURE ELECTRODE FORCE **Check existing gages on spot, seam, or projection welders or at time of set up. Easy to use, saves time, acts as a production check. Force range: 0 to 4500 pounds. Small, portable. Bulletin GEA-3628B.**

PREVENT CURRENT VARIATIONS **Where the insertion of magnetic material in the throat of the welding machine causes weld variations, the current-regulating compensator keeps current constant to within plus or minus two percent. Bulletin GEA-4207.**

Solar Aircraft, like many other plants working on jet engines, has found G-E synchronous control, with slope control added, will enable operators to work to closer tolerances, produce faster, with fewer rejects. The part shown is welded close to the edge but does not split out, and spatter is reduced on both stainless and mild steel.

Use G-E Synchronous Control wherever AN-W-30 and 32 specifications must be met. It assures consistently uniform high quality welds—operates quietly, requires little maintenance. Like all G-E electronic equipment, it has long life, is enclosed in a compact unit that may be mounted on the welding machine or wherever convenient. Easily inspected. Write today for Bulletin GEA-4699. *General Electric Company, Schenectady, N. Y.*

GENERAL ELECTRIC

645-54

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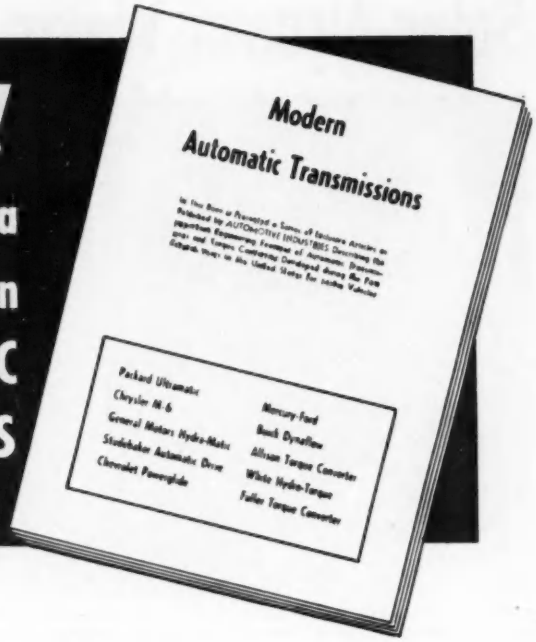

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  Automatic Drive
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HOT Lacquer NEWS

PUBLISHED PERIODICALLY BY HERCULES POWDER COMPANY IN THE INTERESTS OF BETTER FINISHES AND FINISHING

Douglas Cuts Finishing Time in Half By Using Hot-Spray Lacquer

New Process Adopted for Navy Aircraft Production at El Segundo, Calif.

Douglas Aircraft Company (El Segundo Div.) has adopted hot-spray lacquer for finishing of many metal parts, including aluminum, at El Segundo plant. Use is growing steadily, because of savings such as these reported by their process engineers:

Time saving equivalent to 27½ hours in finishing AD-4 airplanes.

Booth time cut from 27½ hours to 18½ hours with present crews and equipment.

Equivalent of 2 gals. of lacquer and 8 gals. of thinner saved per plane.

Hot-spray method, with only one coat, removes hazard of sanding through the first coat of lacquer on rivet heads and skin laps.

This AD-4, built by Douglas for the Navy, is one of hundreds on which hot-spray lacquer is used to cut finishing costs and time.

Workman applies a single coat of hot-spray lacquer modified with special thinner for hot-spray application.

The conclusions which led Douglas to use hot-spray lacquer for Navy production, based on thorough tests, were:

1. Required film thickness can be applied by one hot cross coat where two cold cross coats are necessary.
2. Salt spray and weatherometer tests show the hot sprayed film to be superior.
3. Smoother and glossier appearance.
4. Eliminates sanding between coats.
5. Affords maximum uniform film thickness over rivets and seams, by elimination of scuff sanding. This, in turn, gives better protection in service.
6. Reduces application time 50% with a resultant increase in production.
7. Saves materials by less over-spray and less solvent required.
8. Has better flow-out; decreases tendency to sag, blush or orange peel.

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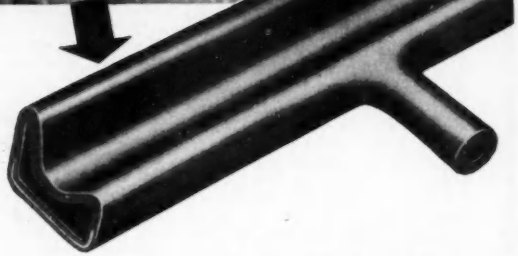
Another new development using

B. F. Goodrich Chemical Company *raw materials*

Hycar seal made by Parker, Stearns & Co., Brooklyn, N. Y.
Photo courtesy of Republic Aviation Corp., Farmingdale, Long Island, N. Y.

safest seal

FOR A THUNDERJET



THAT'S the greenhouse of a Thunderjet, ready to slip into position. When it does it will stay sealed air-tight, even at supersonic speeds and high pressures.

You wouldn't know that dozens of seals had been tried and found wanting until Hycar was used for the job. These inflatable seals of various materials would crease and fold in the corners or pull out of the channel. Some actually became soft under high temperatures. Some "ballooned" into the cockpit.

All that happened before a Hycar OR-25 compound was used. The seal is a U-shaped tube with a short intake tube connected to the Thunderjet's compression pumps for fast inflation to lock the seal. The tensile strength of Hycar, its low compression set, its resistance to low and high temperatures, its oil resistance and aging make it the ideal rubber compound for the purpose.

Hycar OR-25 is just one of a wide range of highly useful rubber compounds. They've helped solve many "tough" problems, because they are so versatile. For Hycar has advantages that exactly meet many civilian *and* defense needs.

Hycar has outstanding resistance to oil, gas and many chemicals. It resists heat and cold, weather and wear, abrasion and more hard-to-meet conditions. It may be just what you need to improve or develop a product. Right now demand for Hycar exceeds supply. But we can supply experimental quantities for development work. For helpful information and technical service, please write Dept. HD-6, B. F. Goodrich Chemical Company, Rose Bldg., Cleveland 15, Ohio. In Canada: Kitchener, Ontario. Cable address: Goodchemco.

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

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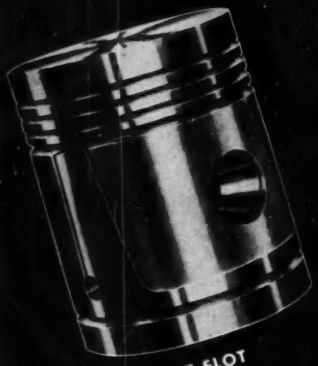

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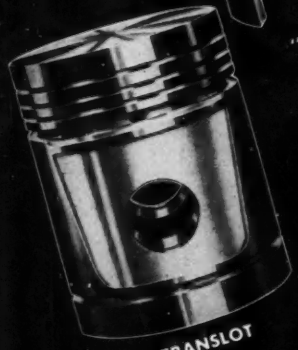

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